Ministry of Health of Ukraine
Ukrainian Medical Stomatological Academy

OPTIMIZATION OF CLINICAL AND LABORATORY STAGES OF MAKING OF COMPLETE REMOVABLE DENTURES DEPENDING ON THE CONDITION OF THE TISSUES OF FOUNDATION AREAS

Poltava-Chernivtsi - 2019

Міністерство охорони здоров'я України
Українська медична стоматологічна академія

Дворник В.М., Кузь Г.М., Бєліков О.Б., Тесленко О.І., Єрис Л.Б.,
Лугова Л.О., Шеметов О.С., Мартиненко І.М.,
Марченко К.В.

ОПТИМІЗАЦІЯ КЛІНІЧНИХ І ЛАБОРАТОРНИХ ЕТАПІВ ВИГОТОВЛЕННЯ ПОВНИХ ЗНІМНИХ ПРОТЕЗІВ ЗАЛЕЖНО ВІД СТАНУ ТКАНИН ПРОТЕЗНОГО ЛОЖА

Посібник призначений для студентів стоматологічних факультетів вищих навчальних закладів, інтернів і лікарів-стоматологів англомовної форми навчання.

Ministry of Health of Ukraine
Ukrainian Medical Stomatological Academy

Dvornyk V.M., Kuz H.M., Bielikov O.B., Teslenko O.I., Yerys L.B.,
Lugova L.O., Shemetov O.S., Martynenko I.M., Marchenko K.V.

OPTIMIZATION OF CLINICAL AND LABORATORY STAGES OF MAKING OF COMPLETE REMOVABLE DENTURES DEPENDING ON THE CONDITION OF THE TISSUES OF FOUNDATION AREAS

This book supports the professional development of stomatological students of establishments of higher education, postgraduate students, and doctors of dental medicine with English language from of study.

Poltava-Chernivtsi – 2019

LBC 56.6уа73
UDC 616.314-77 (07)
О-62

Рекомендовано Вченою Радою Української медичної стоматологічної академії як навчальний посібник для англомовних студентів – здобувачів вищої освіти ступеня магістра, які навчаються за спеціальністю 221 «Стоматологія» у закладах вищої освіти МОЗ України (Протокол засідання №5 від 11 грудня 2019 р.)

Автори

Проф. Дворник В.М., проф. Бєліков О.Б., доц. Кузь Г.М., доц. Тесленко О.І., доц. Єрис Л.Б., ас. Лугова Л.О., ас. Шеметов О.С., ас. Мартиненко І.М., ас. Марченко К.В.

Рецензенти: Фастовець Олена Олександрівна – завідувач кафедри ортопедичної стоматології ДЗ «Дніпропетровська медична академія МОЗ України», доктор медичних наук, професор;

Янішен Ігор Володимирович – завідувач кафедри ортопедичної стоматології Харківського Національного медичного університету, доктор медичних наук, професор;

Каськова Людмила Федорівна – завідувач кафедри дитячої терапевтичної стоматології з профілактикою стоматологічних захворювань Української медичної стоматологічної академії, доктор медичних наук, професор.

Бєляєва Олена Миколаївна – завідувач кафедри іноземних мов з латинською мовою та медичною термінологією

Оптимізація клінічних і лабораторних етапів виготовлення повних знімних протезів залежно від стану тканин протезного ложа /Дворник В.М., Кузь Г.М., Бєліков О.Б., Тесленко О.І., Єрис Л.Б., Лугова Л.О., Шеметов О.С., Мартиненко І.М., Марченко К.В. – 2019. - 147 с.

У посібнику, представленому колективом авторів кафедри ортопедичної стоматології з імплантологією висвітлені питання функціональної і топографічної анатомії зубо-щелепної системи після повної втрати природних зубів. На підставі аналізу даних цього розділу послідовно розглянуті зміст і послідовність клініко- лабораторних етапів виготовлення повних знімних протезів з урахуванням індивідуальних особливостей будови протезного ложа і використанням розробок співробітників кафедри, спрямованих на покращення фіксації і стабілізації конструкцій.

Посібник призначений для студентів стоматологічних факультетів вищих навчальних закладів, інтернів і лікарів-стоматологів англомовної форми навчання.

Contents

Introduction

Prosthetics with complete removable dentures is one of the most advanced types of prosthetics. Loss of teeth leads to a number of complications of local and general nature: dysfunction of chewing, speech and aesthetics, changes in the jaws, mucous membrane of the oral cavity, tongue, temporomandibular joint, disorders of the gastrointestinal tract, and the psychological state of the patient.

According to Vares E.Y. (1993), 15% of people aged 40 and older, require complete removable dentures. Other authors note that people with complete absence of teeth make up 12-18% of the total number of people who need prosthetic treatment. In addition, 20-25% of patients don't use complete dentures manufactured for them (Vasilenko V.M., Zinoviev G.I., Korzh V.G., 1992). The reasons are the following: poor fixation and stabilization of complete removable dentures, as well as injury to the mucous membrane during chewing. Many patients explain the reasons for refusal to use dentures as an inconvenience and uncomforting (complete dentures on the lower jaw hinder the movements of the tongue). Repeated visits to a doctor for new dentures increases the number of people requiring prosthetics with complete removable dentures (Vares E.Y., 1983).

Over the time, the atrophy of the alveolar ridges increases, the masticatory surface of the plastic teeth abrades, and there is a need for the manufacture of a new denture in 3-5 years. It should be added that low quality of manufacturing of complete removable dentures in conditions of mass prosthetics of patients and obsolete technologies exist (Vares E.Y., 1984; Zhulev E.N., 1997).

Complex clinical conditions especially in the lower jaw play an important role in the prognosis of prosthetic quality. They create additional difficulties at the different stages of the manufacture of prosthetics, and in the process of using them. Unwanted factors include different bony protuberances, acute and semi-sharp edges of the inner oblique line, uneven atrophy of the alveolar ridges of the mandible, predominantly in the frontal area; uniform atrophy of the entire alveolar process (Svirin B.V., Markov B.P., Razumenko G.P., 1991). A particularly thin and overly fluffy mucous membrane also negatively affects the quality of the prosthesis (Pogodin V.S., 1975).

The complete loss of teeth poses to the dentist the task to restore some of the missing morphological and functional elements of the masticatory apparatus. They are optimal height of the lower part of the face, occlusal contact of the tooth rows, central relation and dental articulation, sagittal and transversal occlusal curves; to pick up the shape and colour of artificial teeth; to restore the normal appearance of a person at rest during chewing, speech and other functional states.

The complexity of the high-quality prosthetics of patients with complete loss of teeth is due to the fact that the clinical characteristics of the supporting tissues are quite diverse, constantly changing. That is why an individual approach to the creation of stable dentures is needed.

Part I

FUNCTIONAL AND TOPOGRAPHIC ANATOMY OF THE DENTOFACIAL SYSTEM AFTER THE COMPLETE LOSS OF TEETH. FUNCTIONAL IMPRESSIONS

Complete loss of teeth leads to significant morphological, functional and aesthetic changes in the maxillofacial area. Low-quality prosthetics deprives a person of the possibility to feel the taste of food and prevents the primary process of food by saliva enzymes (Savvydy G.L., 1997; Shepenko A.G., Nykonov A.Yu., 1998; Shepenko A.G., Nykonov A.Yu., Pogorelaya A.V., 1999). The pronunciation becomes worse with the loss of teeth. Hollow cheeks and deep wrinkles make old the face. Functional and aesthetic problems depress and exasperate a person (Drahobetskyi M.K., 1988; Shvartszaide V.V., 1993).

Changes in the facial skeleton

Complete loss of teeth (adentia totalis secundaria) causes functional disturbances, accelerates involution of the facial skeleton and soft tissues. The main purpose of prosthetic treatment of patients with complete loss of teeth is to restore functions and aesthetic aspects of the maxillofacial system with complete dentures.

It is known that atrophic changes in the maxillofacial area are significant due to the loss of teeth. The ridges and the body of the mandible become thinner, the angles dull. A person who at a young age had a moderate developed chin and a strong laceration later has a mouth falling back and prominent chin due to the loss of teeth and atrophic processes.

Changes are not limited only by lowering the height of the lower face. The general displacement of the face downwards and backwards due to smoothing of the facial and frontal relief occurs as a result of reduction of masticatory apparatus. For example, the bridge of nose is flattened and the transition smooth tissues covered the bridge of the nose becomes less expressive as a result of reduction of masticatory apparatus. The profile of pear-formed opening is deformed due to the loss of teeth and atrophy of maxillary bones which results from lowering of nasal axis. This change causes lowering of the nasal tip which is typical for complete teeth loss. The form of the convex part of caudal bone is changed due to the deformation of maxilla bones which leads to the deepening of canine fossa.

The combination of all changes in the facial skeleton causes the deepening of the nasolabial fold. The character of changes in the angle of the mandible defines the shape of the mandible, nasolabial fold, and causes the lowering of the corners of the mouth.

The changes also affect the orbital process of the zygomatic bone. It is distorted into the retraction and causes the falling of the temporal muscle in its anterior portion. The depth and shape of the falling of the tissue of the

temporal region determine the main direction of wrinkles around the outer corner of the eye.

The change of the relief of the frontal part of zygomatic process in the frontal bone leads to a thickening of the eyelid that hangs by outer edge over the corner of the eye. The eyelid becomes thin and flabby.

a b

Fig. 1 Deep changes in the shape of the face and the facial skeleton with complete loss of teeth and untimely prosthetics:
a – front; b – profile

With changes in the maxillofacial skeleton as a result of reduction of the jaws and thinning of the zygomatic bones, the cheeks fall. Hypotonia of masticatory and mimic muscles is typical for persons with complete loss of teeth (Fig. 1).

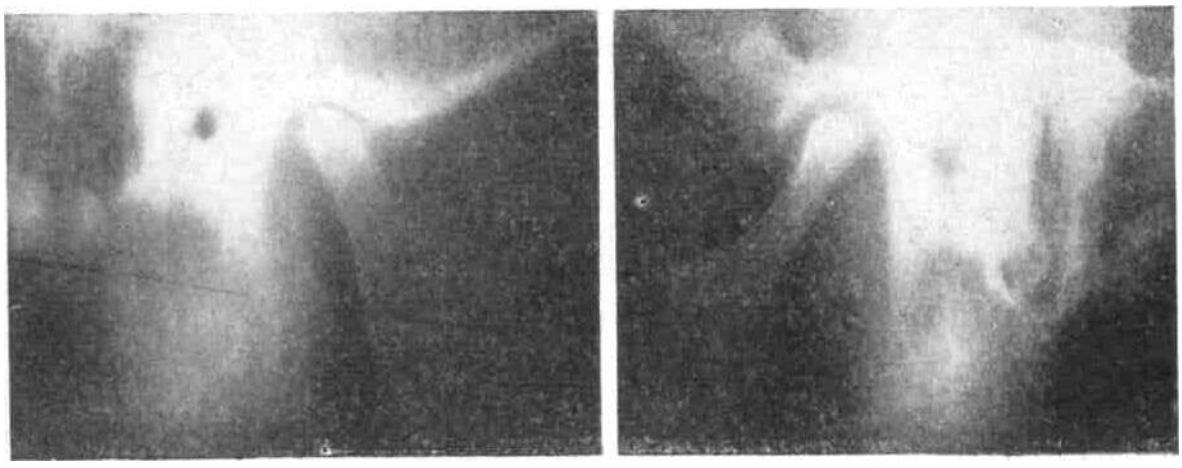
Changes in the temporomandibular joints

As the result of chewing by toothless alveolar processes and excessive compression of the jaws, significant changes occur in the temporomandibular joints. The absence of teeth makes the patient to use other methods of grinding and crushing the food, for example, with the help of thumbs, tongue and complete removable denture (as a rule the upper one). Due to this unnatural chewing method, the distorted stereotypes of joint movements are formed at the unobserved height of the bite. They are compensatory and adaptive.

Changes in the temporomandibular joints due to the loss of a fixed facial height initially have a functional character. Vertical movements of the mandible at the same time do not change, because the muscles are the main determinants. However, sagittal and transversal movements in the joints undergo significant changes, because they are not controlled by the depth of the frontal overlap by of the teeth by the height of the cusps and the degree of curvature of the sagittal and transversal occlusal curves. Before the loss of the last pair of antagonistic teeth, the lower jaw is in a steady state, since it has three points of support: two - in joints, one - between dental rows. In this

case, special important role belongs to molars which protect joints from overload. When bite the food, the joints are exposed to very powerful chewing force. During the chewing of food by molars, the force of pressure of the articular heads on the intra-articular disks and the slopes of the articular tubercles decreases, especially in the final, IV phase of chewing movements, by Gysi - in the phase of food grinding and the replacement of the mandible to the central occlusion.

In the absence of all teeth, the lower jaw is unstable. The articular heads are increasingly tightened upwards and backwards. Initially the muscles that pull out and pull down the lower jaw counteract of it. Later the strength of the group of lifters begins to prevail. Mimic muscles, especially the orbicular muscle of the mouth, help them. The impossibility to chew food leads to the fact that a person is accustomed to crush and grind it with the alveolar ridges, and the tongue. In this case, vertical movements of the lower jaw are dominated. In the joints, there are combined movements: rotational movements in the back-lower portion and translational - in the anterior-upper previous. The swing of these movements immediately after the loss of teeth is much higher after the loss of teeth. Subsequently due to the morphological rearrangement in the muscles and joints the swing is narrowed. At the same time in the joints there are degenerative and atrophic processes, and reconstructive ones. The height of the articular tubercle decreases, the angular contours of the articular tubes are smoothed, and the intraocular discs, due to the displacement of the articular heads, are thinned in distal regions, and in some cases they are deformed (Fig. 2).



a b

Fig. 2 Lateral tomogram of both joints (a, b). Drastic thinning and deformation of the heads. Sclerosis of articular areas

The transverse movements of the lower jaw are performed not along the spherical surface, but along the horizontal one approaching the plane.

The posterior wall of articular capsule is restrained due to significant approaching of the lower jaw to the upper one and displacement of the articular heads. Often the chorda tympani is also restrained and adjoins to the back wall of the capsule; it is carrying the taste branches to the mucous

membrane of the tip of the tongue and its anterior-lateral portions. The limiting of this nerve leads to a disturbance in taste. Sometimes other changes are observed (noises in the ears, dizziness, joint pain, earache, headache, glossalgia and neuralgia).

As you know, the anterior teeth of the upper jaw together with the alveolar ridge are tilted forward. The lateral teeth are tilted by crowns outwards, but by the roots inside. If you line through the necks of teeth, the outlined arc (alveolar) will be the smaller than dental arc, lined on the cutting and chewing surfaces of the teeth.

Changes in the bone tissue

Somewhat different relations are formed between the dental and alveolar arches on the lower jaw. At orthognathic bite, the incisors stand on the alveolar part. The posterior teeth with their crowns are inclined to the tongue and the root is outside. For this reason, the lower dental arch is narrower than the alveolar one. Consequently, with an orthognathic bite if all teeth are present, the upper jaw is narrowed upwards, the lower one expands downwards. After complete loss of teeth this difference is obvious creating a progeny relation of toothless jaws.

Atrophy of the alveolar part has its own patterns. Thus on the upper jaw its buccal part is more atrophied and on the lower one, it is lingual part. Due to these changes the upper alveolar arc becomes narrower at the same time as the expandable lower one. The relation of the jaws in the transversal direction is changed. The lower jaw then seems to be expanding (Fig. 3).

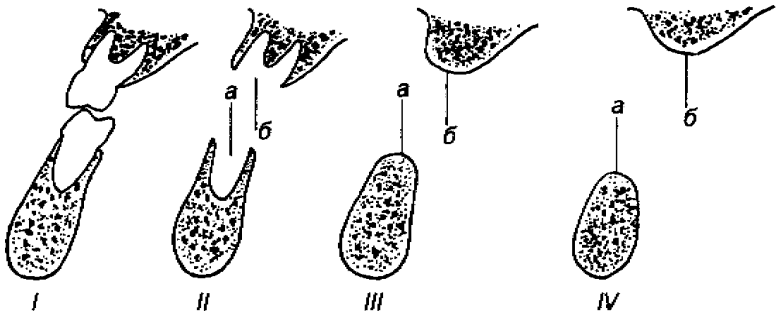


Fig. 3. Changes in the relation of alveolar parts after loss of teeth:

I – the relation of the first molars at the front section;

II – alveolar parts after removal of molars, the lines from a to b correspond to the middle of the alveolar parts;

III and IV – with the development of atrophy the line a deflects outward (left), with the lower jaw as though expanding

These moments complicate the setting of teeth in the prosthesis and affect the fixation and chewing effectiveness.

Loss of teeth should not always be considered a phenomenon of age-related nature, since their loss due to age-related atrophy of the alveolar part is observed only in the elderly. From this point of view the term "senile (gerontal) progeny" should be considered as conditional, because progeny

may occur after loss of teeth at any age. In the presence of a patient, this term can be used with epithets "senile", "age-specific", and "involution".

Clinical picture becomes even more complicated if the patient has a sharp discrepancy between the size of the alveolar arc of the upper and lower jaws, since there is a small upper jaw and a large lower one. The great variance between upper and lower dental rows leads to the marked "senile progeny" and complicates the conditions for prosthetics.

In the upper prognathy after complete loss of teeth, the relation between the alveolar arches is somewhat different. The upper prognathy is characterized by the fact that the upper anterior teeth protrude regarding the same teeth of the lower jaw. With complete loss of teeth and unsteadily marked we notice relatively normal relation of toothless jaws.

In the case of excessive development of the upper jaw, prognathic relation of the jaws is retained after complete loss of teeth. This creates a sharp discrepancy between the sizes of artificial dental rows of the upper and lower jaws which affects the stability of the prosthesis and its functional qualities.

After tooth extraction the alveolar ridge undergoes to the reconstructing, which is accompanied by the formation of a new bone that fills the floor of the alveolar socket, and the atrophy of its free edges. The reconstruction is not stopped after the healing of bone wounds accompanied by predominance of atrophy. It is associated with the loss of function of the alveolar part and it is often called atrophy from inactivity. The nature and degree of such atrophy also depend on the cause of the extraction of the teeth.

Thus, in periodontisis, atrophy is more marked. Therefore, there is a reason to believe that after removing of the teeth, reducing the alveolar part is caused by the functional loss and periodontium due to the causes did not stop its action. Consequently, we encounter another type of atrophy - the alveolar bone atrophy caused by the general pathology. In addition to atrophy from inactivity, resorption in general and local illnesses (periodontal disease, periodontitis, diabetes, etc.) the atrophy of alveolar ridge can develop.

The atrophy of the alveolar part is irreversible, therefore the more time passed after the removal of the teeth, the more marked the reduction of the bone. Prosthetics does not stop the phenomena of atrophy, but intensify them. This is explained by the fact that for a bone an adequate stimulus is the stretching of attached ligaments (tendons, periodontium), but the bone is not adapted to the perception of the compression forces, which creates the basis of a removable prosthesis. Atrophy may be exacerbated by improper prosthetics with an uneven distribution of chewing pressure, directed primarily to the alveolar ridge.

Thus, different individuals may have different degrees of severity of atrophy of the alveolar ridge: some alveolar ridges are well preserved, and sometimes there are cases of extreme degree of atrophy. The hard palate becomes flat; atrophy often reaches the nasal spine of the anterior part. Not all sections of the upper jaw are equally atrophied. The tuber of the upper jaw and palatine torus are atrophied progressively smaller.

At the lower jaw, you can also observe different degrees of atrophy - from the slight to the complete disappearance of the alveolar part. Sometimes due to atrophy, the mental foramen may appear directly under the mucous membrane and the vascular-nerve bundle is restrained between the bone and the prosthesis.

The alveolar part disappears with significant atrophy. The foundation areas is narrowed, and the points of attachment of the maxilla-sublingual muscle are at the same level as the edge of the jaw. During their reduction and movements of the tongue, the hyoid gland is superimposed on the foundation areas.

There are various classifications of different types of atrophy for the upper and lower jaws.

Schroeder identified three types of upper toothless jaws (Fig. 4). A well-preserved alveolar ridge, well-defined tubers and a high palatine vault characterize the first type. The transitional fold, the attachment for muscles and folds of the mucous membrane are relatively high. This type of toothless upper jaw is most favourable for prosthetics, since there are well-defined points of anatomical retention (high palatine vault, marked alveolar ridge and tubers of the upper jaw, highly located points of attachment of muscles and folds of the mucous membrane which do not prevent the fixation of the prosthesis).

a b c

Fig. 4. Types of atrophy of the alveolar processes of the upper jaw by Schroeder: a – the first; b – the second; c – the third

The second type is characterized by mild atrophy of the alveolar ridge. The ridge and the tubers of the upper jaw are still preserved, the palatine vault sharply expressed. The transitional (mucobuccal) fold is located a little closer to the top of the alveolar process as compared (with the first type. The fixation of the prosthesis may be affected by acute reduction of mimic muscles.

The third type of toothless upper jaw is characterized by significant atrophy: the alveolar processes and tubers are absent, the palatine vault is flat. The mucobuccal fold is located in one horizontal plane with a hard palate. For prosthetics of such toothless jaw, there are considerable difficulties due to the absence of the alveolar process and the tubers of the upper jaw, the anterior and lateral movements of the prosthesis during chewing are free. The low attachment of the fraenum and the mucobuccal fold causes movement of the prosthesis.

After the loss of teeth, the configuration of the alveolar ridge in each patient also becomes individual (Fig. 5).

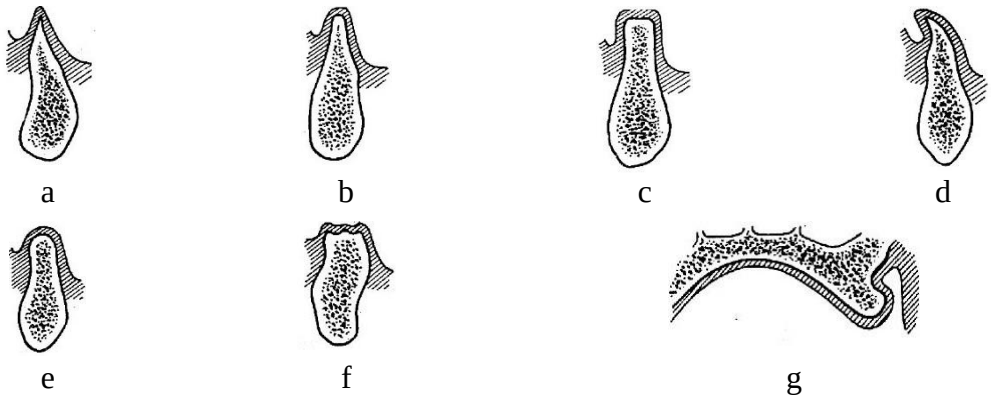


Fig. 5. Forms of alveolar ridge:
a – pointed triangular; b – in the form of a truncated cone; c – rectangular; d – awl-shaped; e – half-oval; f – flattened; g – pine-shaped

It is necessary to remember that obtaining of individual impressions complicates the relief of the alveolar process and external slope: with a overhanging, flat or straight (Fig. 6).

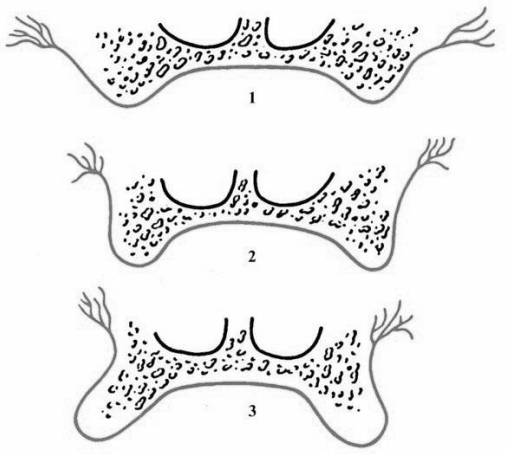


Fig. 6. Forms of vestibular alveolar ridge slope: 1 – flat, 2 – straight, 3 – overhanging

The maxillary tubers have important role for stabilization of complete removable dentures. Therefore it is important to take into account the vestibular and distal maxillary slopes for making of impressions. Excessively marked slope prevents the insertion of the prosthesis. If a thorough medical examination demonstrates the difficulty or impossibility for prosthetics on the foundation areas the dentist proposes the surgical correction of one or both maxillary tubers.

During examination of patients with complete loss of teeth the dentist must pay attention to the presence of palatal torus. It can have different shapes (oval, round, oblong), size (from slight to very significant) and location (in the front third part, in middle or distal part of the hard palate).

In any case, the prosthesis should not set on the bony jugum. Otherwise, torus mucosa is injured during chewing movements.

Atrophy of the alveolar processes is irregular on the upper and lower jaws and has the opposite characteristics: the upper jaw atrophy slowly than lower one, atrophy of the maxilla has centripetal type (i.e. in the direction from the outside to inwards) and atrophy of the lower jaw is centrifugal. Complete removable dentures of the lower jaw has less favourable functional conditions because the tip of the mandibular alveolar bone is so close to the body of the mandible because of non-muscle space is not enough to fix the denture base. These patients need surgical preparation for prosthetics: 1) vestibular plastics; 2) frenulum plastics; and 3) reconstructive surgery to increase the height of the alveolar bone compressionally: by distraction method or by using of the BIO-OSS, Colapan, crushed bone autotransplant and others.

The characteristic of types for toothless lower jaw was suggested by Keller. He distinguished four types of atrophy (Fig. 7).

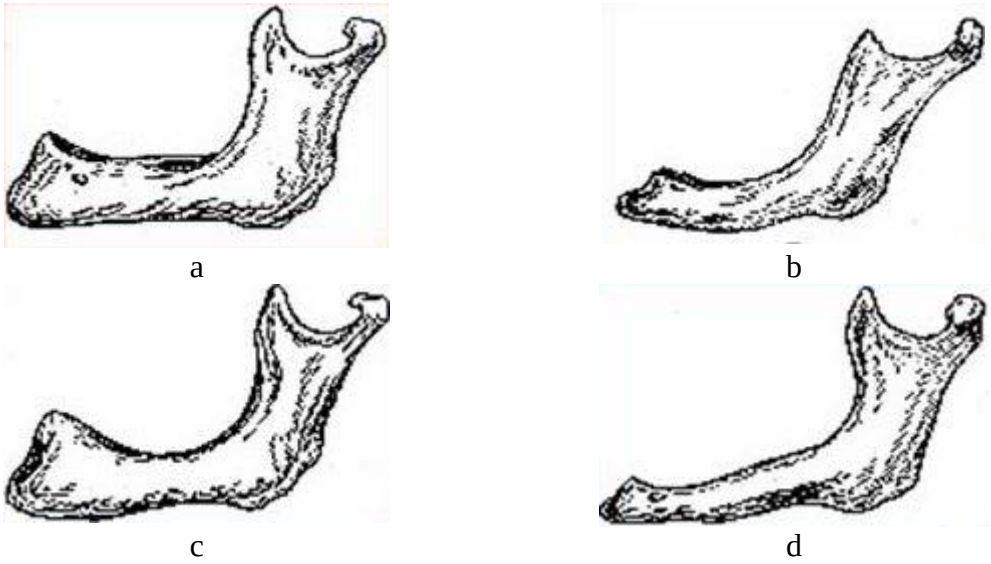


Fig. 7. Types of toothless jaws by Keller:
a – the first; b – the second; c – the third; d – the fourth

The *first* type: alveolar part is slightly and uniformly atrophied. A rounded alveolar ridge is a convenient base for prosthesis that restricts motion during shifts forward and sideways. The points of attachment of muscles and folds of mucous membrane are located at the base of the alveolar part. This type of jaw is presented when teeth are removed simultaneously and atrophy of the alveolar ridge is slow. It is the most convenient condition for prosthetics, although it is rare.

The *second* type is characterized by severe, but uniform atrophy of the alveolar part. This alveolar ridge rises above the bottom of the cavity; it becomes narrow in the front part and not suitable for prosthetics. The places of muscles' attachments are located almost at the ridge. This type of toothless lower jaw is difficult to obtain stable and functional impression, since there are no anatomical conditions for retention, and the high location of points of muscles attachments during their contraction causes the displacement of the

prosthesis. The use of prosthesis is often painful due to the sharp edge of jaw-hyoid line, and in some cases, the prosthesis is successful only after smoothing.

The *third* type is characterized by distinguished atrophy of the alveolar lateral portions and relatively preserved alveolar ridge in the anterior part. Such toothless jaw is formed in the case of early extraction of posterior teeth. This type is relatively favourable for prosthetics due to the lateral oblique divisions between oral and sublingual line is flat, has almost concave surface, and are free from points of attachment of muscles. The presence of alveolar ridge in the anterior jaw prevents prosthesis from shift in frontal-posterior direction.

The *fourth* type: alveolar atrophy is the most noticed in front part and relatively preserved in the side sections. As a result, the prosthesis loses supporting in the anterior portion and slips forward.

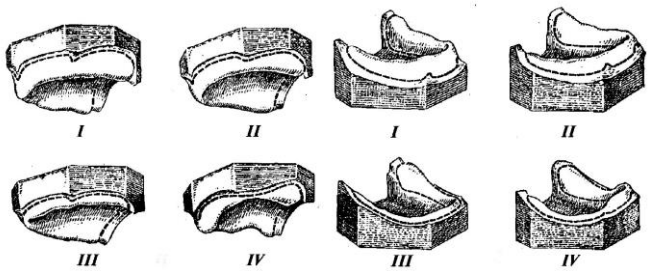
Y.M. Oksman proposed common classification for the upper and lower toothless jaws. According to this classification there are four types of toothless jaws (Fig. 8).

The *first* type: high alveolar part, high tubers of upper jaw, marked palatine vault, high location of mucobuccal fold and points for attachment of fraenum.

The *second* type is characterized by the mild atrophy of the alveolar ridge and tubers of the upper jaw, the palate is more minor, and attachment of movable mucosa is lower.

The *third* type differs by significant, but uniform atrophy of the alveolar region and tubers, flattened palatine vault. Moving mucous membrane attached at the top of the alveolar.

The *fourth* type is characterized by irregular atrophy of the alveolar ridge, it combines various features of the first, second and third types.



a b

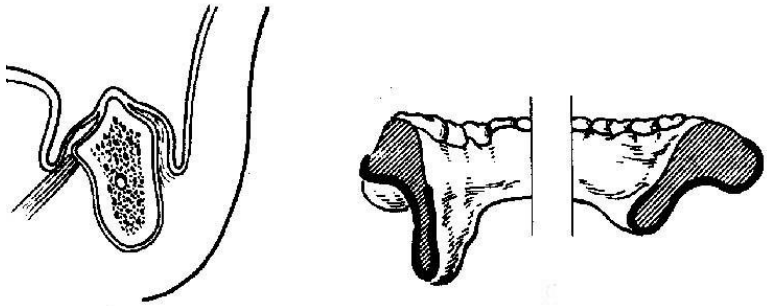
Fig. 8. Classification of toothless jaws by Y.M. Oksman:
a – for upper jaw; b – for lower jaw; types of jaws: I – the first; II – the second; III – the third, IV – the fourth

High alveolar ridge, low location of mucobuccal fold and fraenum attachment points re typical for *the first type* of toothless lower jaw. The *second* type is characterized by regular atrophy of alveolar part having the moderate severity. The *third* type is characterized by the absence of alveolar edge. Sometimes it presents but it is not large. The atrophy of jaw body is possible. The *fourth* type: there is irregular alveolar atrophy because of the

removal of teeth non-simultaneously.

In the inner surface of the lower jaw in the area of molars there is a line of attachment of oral and sublingual muscle so-called "internal oblique line" (linea mylohyodea). As this area of bony tissue has sufficient functional loading from the similar muscle, it does not atrophied and can increase over neighbouring areas. The linea mylohyoidea is defined as sharp, flat or convex by palpation.

If the linea mylohyoidea is sharp the denture base ends at this border. If the denture base overlaps sharp linea mylohyoidea the mucous membrane is injured (Fig. 9).



a b

Fig. 9. Topografy of the internal oblique line of the mandible and mucobuccal fold (a); borders of the denture (b)

The linea mylohyoidea is the protruded part of the inner surface of the mandible and its overlap by the denture base will lead to formation of a niche between the edge of the prosthesis and body of the jaws and prevents the formation of the blocking valve.

Clinical observations prove that the depth of retention depth in this area is individual and should be considered in the making of a complete removable denture.

We studied models of toothless jaws in a parallel surveyor to determine the depth and borders of retention' area for further construction of complete removable denture.

We used parallel surveyor of domestic origin (Scientific and Manufacturing Company "Iscor", Severodonetsk city). To determine the depth of retention areas three gauges with sizes of protruded edges equal to 1 mm, 2 mm, and 3 mm have been manufactured (Fig. 10).

Fig. 10. Gauges' sizes 1.0 mm, 2.0 mm, 3.0 mm

The table and base of parallel surveyor were equipped with a device that provides its perpendicularity concerning the vertical rod.

The technique for parallel surveyor is the following: the model is set on the table of the parallel surveyor according to the common method called "method of free orientation". This angle of slope for model in the anterior-posterior and lateral directions is determined by marking of the oblique line on the right or on the left, in the frontal or in the posterior parts.

After that the border lines are marked on the model, which divide the foundation areas into two zones practically in all cases for studying mandible models. The first zone (from the alveolar ridge to the top of oblique line) is the location of the main part of the base of the prosthesis. The second zone the depth of which is determined by the depth of undercuts serves as a retention area where the part of fixation is located.

On the mandible models the border line is important for determination of intraoral boundaries of prosthesis since the vestibular boundary coincides with the contour of neutral area of vestibular mucous membrane (Fig. 11).

Fig. 11. The lower jaw with marked ridge protruding internal oblique line (parallelometery)

Areas from ridge of alveolar process to protruded part of the oblique line and from oblique line to the muccobuccal fold in sublingual area are obtained on the models of toothless mandible.

The depth of retention is 1 mm – 3 mm according to the measurements.

These studies can determine the sublingual border of the complete removable denture of the mandible taking into account the anatomical shape of its inner surface.

Parallelometery as a diagnostic method has a great practical importance. It allows determine the depth and topography of the retention zone. If the depth is small (up to 1 mm or less) it can be neglected in case of traditional technology based on ways of insertion of the prosthesis.

For marked deep of retention zone to prolong the boundaries is impractical because even long edges will not provide a tight contact of the prosthesis with mucous membrane. As the method of compensation for retention depth we use the features of elastic plastic for manufacturing of edge valve.

The round or oval shape bony projections that resemble haricot or bean are present in some patients on the inner surface of the mandible at the level of premolars often symmetrically on both sides.

With the prominent atrophy of the alveolar bone, they become additional retention point and improve the fixation and stabilization of the prosthesis. The mucosa in these areas is thinned and very sensitive. Therefore, on the model we must isolate these bony projections and cover them with the base prosthesis.

The bony formations of various shape, size and number are formed in the middle of the chin on the inner surface of the mandible. There are from one to four bony projections; they are single or combined in the form a rough surface, tubercle or hung roof (Fig. 12).

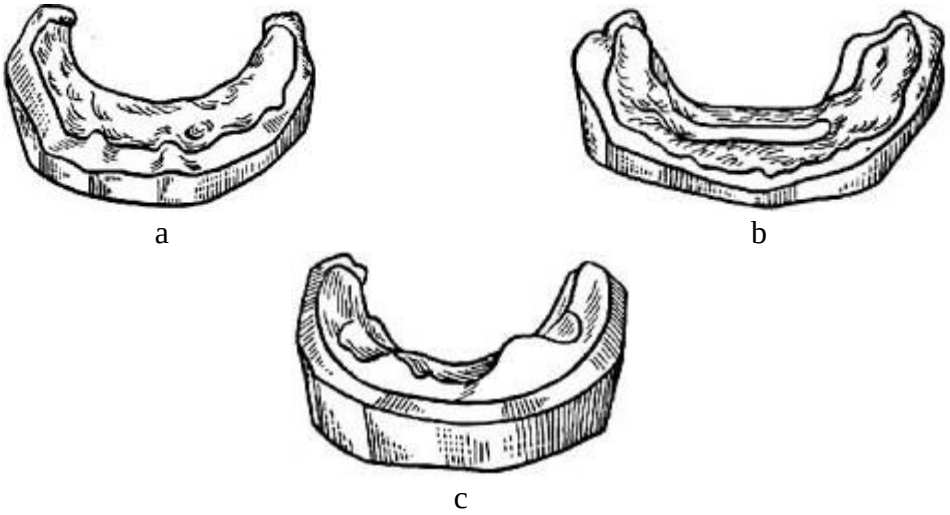


Fig. 12. Exostoses (bony projections) on the lower jaw: a – limited; b – prolonged; c – stabilized

In native stomatological literature the marked bony formation of this area is called mental elevation (torus genio-lingualis). According to Paris nomenclature it is called spina mentalis i.e. tendon of muscles attached to the axis of chin with additional layer of bony tissue. The difficulties in prosthetics occur in the case when the tip of the atrophied alveolar process of the mandible is located below the torus genio-lingualis cavity. Isolation of this bone formation on the model and the overlapping of it by the prosthesis base are insufficient. We have to make a two-layer base lined with elastic plastics in the area of the mental elevation.

There is an interesting relation between frequency of the exostoses, geographical conditions, and racial characteristics. According to K. Ferst (1908) exostoses are often present in people living in the Northern Hemisphere (Eskimos, Laplanders, and Icelanders).

The changes in the mucosa

The condition of mucous membrane covering the alveolar processes and palates has important significance for prosthetics. Thin, transparent, loose, and movable mucous membrane forming folds is unfavourable for prosthetics. Thin and transparent mucous membrane leads to traumas during prosthesis using. The loose and movable mucous membrane is the cause of poor fixation on the functional impression.

To choose a method of a functional impression obtaining it is necessary to take into account the compliance of mucous membrane. As it is irregular in different aeries of foundation areas it is possible to overload in some areas during chewing. In places where mucous membrane is compliant, it is compressed and decreases under load. In addition, in those areas where the mucous membrane is thin and compliable it is restrained between the bony base and the base of denture. As a result, blood circulation is insufficient, the mucous membrane is inflamed, and bones of jaws are atrophied. To improve the quality of complete removable dentures we should determine the amplitude of the soft tissue compliance.

Supple describes four classes of mucous membrane of foundation areas.

The first class. The upper and lower jaws have well marked alveolar processes covered with slightly compliant mucosa. The palate is also covered with a regular layer of mucous membrane, which is moderately compliant at the back of its third part. Natural folds of mucous membrane (frenulum of upper lip, cheeks and tongue) on the upper and lower jaws are sufficiently moved from the top of the alveolar part. This class of mucosa is a convenient support for the prosthesis, including a metal base.

The second class. The mucosa is atrophied, covering the alveolar ridge and palate with a fine strained layer. Sites of natural folds are slightly closer to the top of the alveolar part. Dense and thinned mucosa is less suitable for denture supporting, especially with a metal base.

The third class. Alveolar part and the back third part of the hard palate are covered with loose mucous membranes. Such its condition is often combined with low alveolar crest. Patients with such mucous membrane

require preliminary treatment. After the prosthetics, they should follow the rules for prosthesis using and consult with a doctor.

The fourth class. Movable bands of mucosa are located longitudinally and are easily shifted from a slight pressure of the impression mass. Bands can pinch, making it difficult or impossible to use prosthesis. These folds occur mainly on the lower jaw, preferably if an alveolar part is absent.

We include a state of the mucosa which includes alveolar edge with soft "wobbly" crest into independent group. In this case prosthetics is sometimes possible only after its removal.

Mucosa compliance according to Suple classification has great practical importance.

Based on different levels of mucosa compliance Lund describes four zones for hard palate. They are: 1) medial fibrous zone (the area of the sagittal suture); 2) peripheral fibrous zone (alveolar process); 3) adipose zone (area of the transverse palatine folds); and 4) glandular zone (back third of the palate).

The mucous membrane of the first zone is thin and doesn't have submucosal layer. Its compliance is slight. The second zone includes the alveolar process. It is also covered by mucous membrane that almost excludes submucosal layer. The third zone is covered with mucous membrane, which has mild compliance and much adipose tissue. The fourth zone is the back third of the hard palate with submucosal layer with great amount of mucous glands. This layer is soft, springs in the vertical direction, and has the highest level of compliance.

Most researchers bind compliance of mucous membrane of hard and soft palates and alveolar parts with the structural features of submucosa.

E.I. Gavrylov has a different view and believes that vertical compliance of mucous layer of jaw bones depends on the density of vascular submucosal layer. Vessels with their ability to quickly emptied and re-filled with blood can reduce the volume of tissue.

Areas of the mucosa membrane of the hard palate with wide vascular zones which have spring properties the scientist called as the buffer zones (Fig. 13).

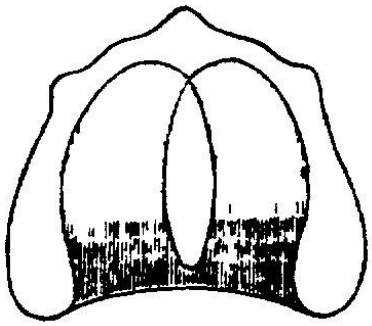


Fig. 13. Scheme of buffer zones by E.Y. Havrylov.
The density of hatching corresponds to enhancing of buffer properties for mucous membrane of hard palate

Results of topographic, anatomical and histological studies with vessels filling (V.S. Zolotko) revealed that mucosa that covers the alveolar processes and the part of hard palate along to sagittal suture contains small vascular fields and buffer properties particularly doesn't have. Fields of mucous membrane located between the base of alveolar process and medial zone have dense vascular areas. The dense of these vessels increases in the direction of the "A". As a result buffer properties of mucous layer of hard palate increase also in the direction of vibrating line.

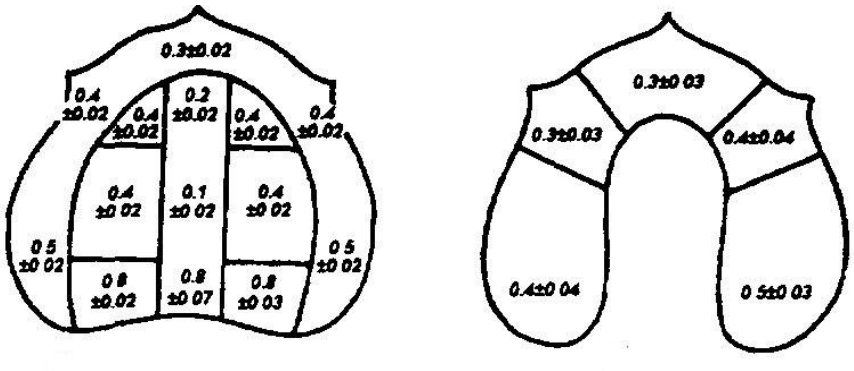
V.A. Zahorskiy during investigation of vibration of the pulse of removable denture for maxilla has determined that its base performs microexcursions under which passes through the vessels of the mucous membrane of foundation areas.

V.I. Kulazhenko using electronic vacuum device studied compliance of the hard palate mucosa in detail. It has been determined that it ranges from 0.5 to2.2 mm. The data about the compliance of the mucous membrane in different parts of the hard palate and alveolar process are the same as topography of buffer zones by E.Y. Havrylov.

Buffer properties of the mucosa for the foundation areas of the upper jaw are changed during the person's life. This is due to the blood vessels changes, metabolic disorders, infectious and other diseases. The state of vessels influences on compliance of mucous membrane of hard palate and character of its reaction to prosthesis activity. The vessels played an important part in the changes of mucous membrane and atrophy of alveolar crest which occur during prolong denture using.

To measure compliance of the oral mucosa we used a device created by Yerys L.B., Rubanenko V.V., Dotsenko V.I., Vernyhora S.P., Yaholnyk M.I. (declarative licence No 32838 A of 15.02.2001, bulletin. No1) and improved by Lugova L.O. and Zhonnyk O.S. (declarative licence No (11) 14066, (51) MPK A 61B5/0245 of 15.05.2006, bulletin. No5)

For measurement convenience the foundation areas of toothless upper jaw foundation area toothless upper jaw Yerys L.B. (1999) proposed to divide into 25 sections, and the lower jaw into 24 sections (Fig. 14).



a b

Fig. 14. Distribution of the foundation areas for toothless maxilla (a) and mandible (b) into sections

The obtained results have been recorded into the corresponding area on the scheme of foundation areas upper and lower jaws. If the patient has slight atrophied, moderately susceptible mucosa, the value of compliance is from 0,30 mm to 0,45 mm. However this ideal state of mucosa across the surface of foundation areas is a rare phenomenon. As people lose teeth non-simultaneously the processes of atrophy of bone tissue and mucosa in different parts of foundation areas are marked unequal. Near there are incompliant areas and areas with mucous membrane which gathered into folds. For the prosthetics it is important to know the value of mucous compliant in definite areas and difference of compliant in the neighbouring areas of measurement. In solids (as complete removable denture) pressure is transmitted in all directions equally we have to take into account the difference between the maximum and minimum values of compliance for distal part of mucous membrane. So the same magnitudes of masticator pressure are indifferent for definite areas of foundation areas and for other areas they are critical.

According to the difference of compliance it is necessary to grind the layer of plastic in individual tray in the corresponding section. For example, if in the 21 section of torus (see fig.) on the maxilla the volume of compliance is only 0,05 mm and in the 9 section of the alveolar process it is 0,65 mm, the value of the grinded plastic layer in the area of torus is equal to 0.6mm. In addition to reduce the pressure during differential functional impression the individual tray must be perforated in the 21 section.

Not always prosthodontist is provided with appropriate instruments to determine the compliance of mucosa on the foundation areas. In this case it is necessary to use the Lund classification (middle-fibrosis, marginal-fibrosis, adipose and glandular zones). To determine the degree of atrophy it is effective to use Suple classification (normal or little atrophied, mobile forming the fold of mucous membrane.

The correct determination for localization of passive-movable mucosa is important for practical meaning of the prosthetics because it directly affects the formation of tight locking valve. Passive and mobile mucous membrane is between immovable mucosa of alveolar process and active and movable mucosa of lips, cheeks, and floor of oral cavity. Submucosal layer is well developed and mobility is ensured in all directions. For topographical location the passive and movable mucosa coincides with the muccobuccal fold but has definite sizes (Fig. 15).

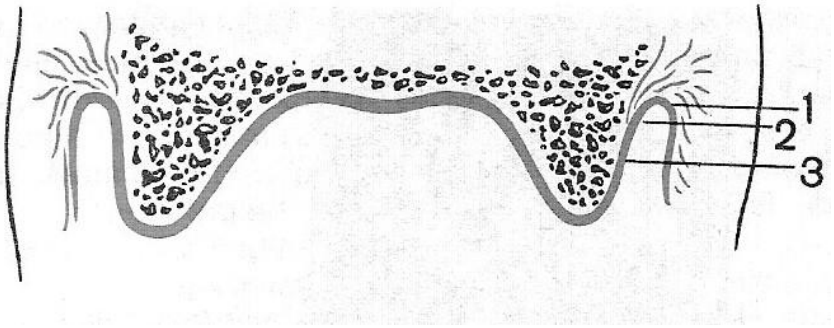


Fig. 15. Mucobuccal fold with complete tooth loss (scheme):
1 – active and movable mucosa; 2 – passive and movable mucosa (neutral zone); 3 – non-movable mucosa

The space in the oral cavity where the forces exerted by the musculature of the tongue are equal and balanced with the forces exerted by the buccinator muscle of the cheek laterally and the orbicularis oris muscle anteriorly is known as the neutral zone. Along the vestibular alveolar ridge slope, neutral zone may be of different width ranging from 1 – 4 mm. The wider and closer it is to the vestibular arch, the better conditions are for normal valve functioning. When the neutral zone becomes narrowed and turns sharply from being compliant to active and movable, even when there are other favourable factors available, the conditions for denture stabilizing significantly deteriorate.

Active mobile mucosa unlike passive or non-mobile mucosa begins to move during muscle contractions. It is covered the denture margins thus creating functional annular valve. Therefore, it is important for the margins of full denture to overlap passive mobile mucosa, and in case of abrupt atrophy of alveolar process even up to 1 mm it should overlap moving mucosa as well.

The boundaries when the mobile mucous membrane turns into immobile are often subtle on the lower jaw, especially on the lingual side. This impedes the functional delimitation of functional area margins and forming functional locking of denture valves. Compliant immobile maxillary mucosa is tightly adjacent to the periosteum. On the lower jaw, it often (sometimes) loses its perfect conformity, becomes slightly movable, and is able to slide along the periosteum. Some patients have accelerated bone atrophy of alveolar process. The mucosa is subjected to atrophy significantly slower than bone tissue and then becomes pursed up. Under the atrophy of the alveolar process, the relief of the foundation area is represented by mucous crest that greatly complicates the uniform distribution of the loading by the denture base onto the functional area tissues.

Therefore, it seems quite reasonable to remove mucosal folds surgically. When a patient rejects the surgical removal of mucosal folds, you may opt to use such impression materials and impression making techniques, which enable to obtain the maximum precise relief about the functional status

of the foundation area tissues without any possible deformities of mucosal folds.

Sometimes, on the lingual side at the level of molars where compliant mucosa along the lingual slope of alveolar process is free, there may appear longitudinal folds parallel to the process. During the procedure of making impression it is essential to straighten them up in order to involve them into creating peripheral locking valve.

Anatomical reference points for placement of the denture margins

While examining a patient who is seeking for prosthetic correction and planning the further treatment steps, is it important to pay attentions to oral muscles functionally related to the periphery of the foundation area. They should be assessed in terms of their functional effects on the mobile mucosa when obtaining the margins of impressions.

Thus, on the upper jaw all the muscles involved in the functional formation of the impression margins are located the outside and on the distal sides of the foundation area. To achieve a good denture fixation or stable balance, it is critical to pay attention to the correlation of the muscle fibrils directions towards the foundation area. In the areas, where muscle fibrils are perpendicular to the foundation area margins, the denture fitting can be significantly impaired. On the upper jaw, such conditions are often seen in the distal parts of the foundation area where the muscles of the soft palate are attached perpendicular to the margins of the foundation area, while on the vestibular side, muscle fibrils are typically arranged horizontally to the foundation area margins (m. buccinator, m. orbicularis oris). Therefore, loose locking valve can be often seen in the distal parts, and relatively strong locking valve is found in the frontal part.

The lower jaw of vestibular side (except for the section from canine to canine), m. buccinator is made up with fibrils directed perpendicular to the margins of the foundation area, thus, when contracting, and they can change the level of the foundation area. On the inside of the lower jaw, fibrils of m. mylohyoideus and m. genioglossus also are perpendicular to the denture basis. Therefore, when forming the impression boundaries, it is essential to consider the functional state of muscles.

Muscles of the upper and lower lips require a particular attention as they can substantially contribute to denture stabilizing, when the prosthodontist takes into account the individual relation between muscles and the vestibular surface of the denture. When the denture is manufactured without considering functional state of lip muscles, denture fixation and stabilization can deteriorate resulting in changing in the patient’s facial aesthetics.

To develop correct treatment plan for edentulous patients and to avoid possible mistakes it is critical to carry out thorough analysis of functional zones of foundation area for both upper and lower jaws.

The foundation area has three zones: the vestibular, distal, and bearing surface. Vestibular area of the upper jaw is divided into three sections: post-zygomatic, lateral and labial (front). Post-zygomatic area is located between

the sulcus pterygomaxillaris and crista zygomaticoalveolaris, and is known Eisering`s space (pocket). Vestibular vault is formed by m. buccinators, which is covered with elastic connective tissue and mucous membranes. The vault becomes wider due to atrophy of the alveolar ridge. This site is little mobile, its mucous membrane can move rather by mouth opening and mandible offsetting than the cheek pulling aside. At this point mandibular coronary process is at the level of post-zygomatic areas and slightly constricts the vestibular vault mucosa, at that Eisering`s pocket shrinks.

Post-zygomatic space, located in the distal region, is difficult to get access to, therefore doctors, especially unexperienced ones, often shorten the denture edge within this area. The depth of this space can be easily determined when the mouth is half-opened and the lower jaw shifts towards the opposite side of space inspected. The width of the space is better seen when the lower jaw is shifted towards the opposite side. When the denture thickness matches the space, this creates the perfect marginal fit along the outer surface of the denture.

The lateral vestibular area is bounded with crista zigomaticoalveolaris and plica buccalis premolaris. The depth of the area is measured by the degree of alveolar ridge atrophy.

Strangulated buccal-alveolar lateral folds can be easily injured by the denture edges; therefore, they should be open when taking an impression in order to prevent injury.

Labial (frontal) portion is located between the left and right buccal folds. It is divided with upper lip fraenum into two zones. M. orbicularis labii superioris is the most powerful when contracting, and as well as m. buccinator, does not significantly alter the oral vestibular vault. To determine the level of transition fold in frontal region, the lips should be gently pulled forward (no more than1 cm).

Thus, the margins of foundation area on maxillary vestibular side are characterized by muscle fibrils arranged horizontal and parallel to the transitional fold. And vestibular functional level of vestibular relief along the transitional fold will not sufficiently change in the denture to be done, As a result, functional and suction impressions are often evaluated as satisfactory. Muscle tone, their contractibility contribute to the denture stabilization. The fact that muscles on this site do not shift mobile mucosa considerably contributes to the denture fixing as well.

While examining distal margin of the foundation area, prosthodontists need to keep in mind that the boundary of the denture does not always correspond the vibrating line (Fig. 16).

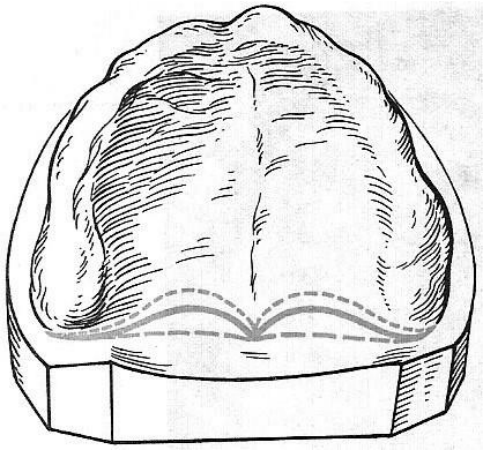


Fig. 16. Configuration options of the vibrating line

The distal denture margin extends to the level of muscle aponeurosis between soft and hard palate. It is important to remember that the width of the margins vary depending on the slope of the soft palate (horizontal, mild, sharp, moderate) (Fig. 17).

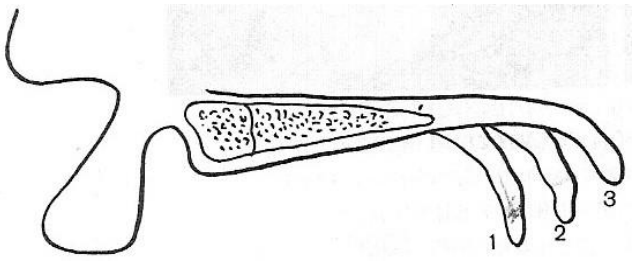


Fig. 17. Forms of soft palate slope: 1 – sharp; 2 – moderate; 3 – horizontal (flat)

In the horizontal position of the soft palate, the denture border is wide enough. It starts 1-2 mm posterior palatal pits, behind the pterygopalatine fossa, and extends 2-5 mm ahead. Compliance mucosa at the site helps create lasting distal valve prosthesis.

When soft palate slope is sharp, the boundary line of the denture reduces to the vibrating line. In such cases the pterygopalatine fossa are left behind the distal edge of the denture, outside the area of the denture base. In order to determine the margins of the denture distal edge accurately, thorough analysis of foundation area tissues is required. When the denture distal edge is determined incorrect and is in front of vibrating line, the denture edge rests on poorly compliant mucosa where the distal valve is weak or absent. When the denture edge is demarcated by vibrating line, the denture will be dropped off from the foundation area by contraction of the soft palate muscles that will be accompanied by mucosal injury and speech disorders as well.

In addition to the soft palate location, there are some other anatomical landmarks for proper identifying the boundaries of the distal denture margins. The distal valve area is behind the maxillary tubercles, along the vault of sulcus pterygomaxillaris, and often coincides with the line connecting these points on a model from both sides. But under any favourable conditions the

distal zone does not provide proper valve functioning, as opposed to the vestibular area, in the distal section the denture lean on the tissues of the foundation area only by its inner surface, and its outer edge is free from surrounding tissues. Moreover, the soft palate contains muscles that have not only horizontal but also vertical direction, and when contracting, then can remove or drop off the denture.

Thus, investigating the topographic peculiarities of the distal foundation area, it is important to avoid haste and inexact assessment when receiving impressions and during the further stages of denture manufacturing by taking into consideration all available individual clinical features to create a full functional valve.

The peculiarities described for the upper jaw are generally characteristic of the lower jaw as well, but there is some specificity. The mandibular foundation area is smaller, while its peripheral parts are larger. Along the entire perimeter, there are groups of muscles, which fibrils, especially on the lingual side, are perpendicular to the edge of foundation area. It impedes obtaining functional impression of mobile tissues and peripheral relief volume of the impression that affects the normal locking of denture valve. In this regard, the foundation area on the lower jaw is divided into more zones: mandibular mucous tubercles (left, right), lateral vestibular zone (left, right) frontal and lingual areas. While examining these areas, it is important to focus on the maximum use of the foundation area, choice of the best method to take impressions and to select the most efficient design of the denture.

Mucous tubercle is located in the middle part behind the molar area, and retro-molar space is bounded by two ridges, oblique and sublingual. Mucous tubercle contains primarily connective tissue and has a small amount of mucous glands. In the posterior parts, the tubercle is bounded by pterygomaxillar fold and buccal muscle. Moreover, the tendons of temporal muscle and fibres of the upper pharynx constrictor are interwoven and imbedded into lingual part of the tubercle. By careful design of functional edges of the impression, the insertion site for attachment of temporal muscle and upper pharyngeal constrictor sets free, and denture margins usually reach only sublingual line. Regardless of the markedness of mucosal tubercle, it should be used for the denture fixing. Typically, only 2/3 of the tubercle is used for this purpose, as to its distal third, ligamentum pterygomandibularis is affected.

According to Sydorenko G.I. (1964), mucous tubercle can be dense and immobile, partially mobile and completely mobile. Dense mucous tubercle must be fully set free, while in the partially mobile tubercle, its only mobile part is covered.

Sometimes, m. masseter can push denture edge on the vestibular side. Therefore, in such cases, we have to create a particular configuration in the individual tray and then in the denture base respectively.

Lingual surface at the level of the tubercle is commonly used as a supporting part. It is important to keep in mind that over linea milohyoidea

there are oblong mucosal folds, which should be straighten during the procedure of taking impression. Lingual surface behind the mandibular tubercle is sometimes used as a support, as to this area covered with mucous membrane, some muscles (m. palatoglossus, m. styloglossus, m. constrictor pharynges superior) run. Excessive thickening of the denture base may result in difficult swallowing and soft tissue damage.

The lateral vestibular zone on the lower jaw has the features identical to those on the upper jaw.

Frontal vestibular (labial) zone is characterized by considerable narrowing of its vestibular arch. Its width seldom exceeds the thickness of the individual trays. This is explained by the fact that the fibrils of m. depressor labia inferioris in this area are directed perpendicular to the outer margins of foundation area and muscle contraction affects the shape and size of the arch. Increased tone of m. orbicularis oris also affects the shape of vestibular arch and impedes correct modelling of impression margin.

The shape of the alveolar buccal folds varies. Usually they are located within the region of canines. In bucco-mandibular alveolar folds there is fibrous tissue that extends towards the oral commissures and joint to the identical tissue of the buccal-maxillary alveolar folds. Joined together, they form the so-called modiolus area. In facial anatomy, the modiolus is a chiasma of six perioral facial muscles held together by fibrous tissue, located lateral and slightly superior to each angle of the mouth; these muscles are orbicularis oris, buccinator, levator anguli oris, depressor anguli oris, zygomaticus major, risorius, platysma, levator labii superioris.

This chiasma is of great importance in providing fine and precise movements of the cheeks and lips; it is an area of tissue where muscles are the most active. This area is extremely important in relation to stability of lower denture, because of the strength and variability of movement of the area. Lower buccal alveolar-folds are also associated with depressor anguli oris.

Lingual lateral zone starts at the level of the last molar and ends at the level of canine and first premolars, underneath it is bounded with linea milohyoidea. It is also important in some cases to use free lingual space for manufacturing hyoid wings, in order to expand the prosthesis. This is possible, when the hyoid space is not filled with hypoglossal sublingual salivary glands and submucosal layer. Otherwise, the denture margin should be modelled in such a way that these tissues can rest on the lingual inclined surface of the denture. It is important to consider the width of the tongue and the degree of its fit to the denture. Excessive pressing over the denture can cause denture displacement. Tongue slope of the denture base should be modelled in the way to provide uniform touch without pressing with lateral tongue sides as well as to get perfect boundary fitting of denture base.

Frontal lingual zone is relatively small and located between the teeth. It is characterized by the direction perpendicular to the margin of foundation area, thus, the margin impressions taken from the foundation area may vary depending on the degree of muscle contraction zone, i.e. the degree of tongue

stretching. In particular, when tongue is stretched to the maximum, the level of denture margin is shorter that in the case when the tongue is stretched minimally. Therefore, when obtaining the lingual side of the impression, it is appropriate to ask patients to move their tongue to the maximum. At this the tongue tip has to reach only vermilion border that enables to get margin fit between tissues and the denture at rest and in dynamics. It should also be kept in mind that the frontal edge should be slightly thickened and rounded in order to provide the uniform distribution of strong muscle forces over large area.

Taking into account the biological responsiveness of oral tissues to full dentures and in order to improve the quality of denture placement and reduce the number of complications it is important to stick to the following guidelines:

Prevent excessive dipping the denture edges into moving anatomical structures, since the excessive denture stabilization can cause pain and traumatic ulceration of the oral mucosa;

The surface of the denture must correspond to the bone relief, not to relief of the mucous foundation area: while chewing, pressure is distributed evenly over the skeletal structure without causing pain, tissue compression and uneven atrophy of mucosa and bone frame;

Prevent uneven pressure onto the foundation area, which is due to the absence of articulation equilibrium, when excess pressure is concentrated in some sites of foundation area causing pain;

Consider the individual specifics of tissue responsiveness within the foundation in edentulous patients. Clinical observations have shown that in some cases, relatively high pressure does not cause any pain and decubitus ulceration, while in others even the minimum pressure provokes unbearable pain and deep sores.

Unfavourable anatomical conditions include considerable atrophy of the alveolar processes, bone prominences, ridges, exostoses, low (or high) frenulum attachment, shape and slope of the alveolar bone. Mandibular retention anatomical structures as internal oblique line (its location), retroalveolar and pear-shaped spaces are of great importance for proper fixation of full dentures.

Therefore, to obtain good locking valve is critical in achieving reliable fixation of dentures. The normal functioning of circular locking valve is possible only when the denture margins come into contact with the mucous membrane of valve area while functioning. Functional shaping of margins in all the areas underlies the successful manufacturing of complete dentures.

Consequently, high-quality full dentures require obtaining a precise impression depending on the individual clinical characteristics including the following: extent and intensity of the alveolar process atrophy, mucosa compliance, anatomical and physiological characteristics of masticatory and mimic muscles, anatomical retention, etc.

FUNCTIONAL IMPRESSIONS

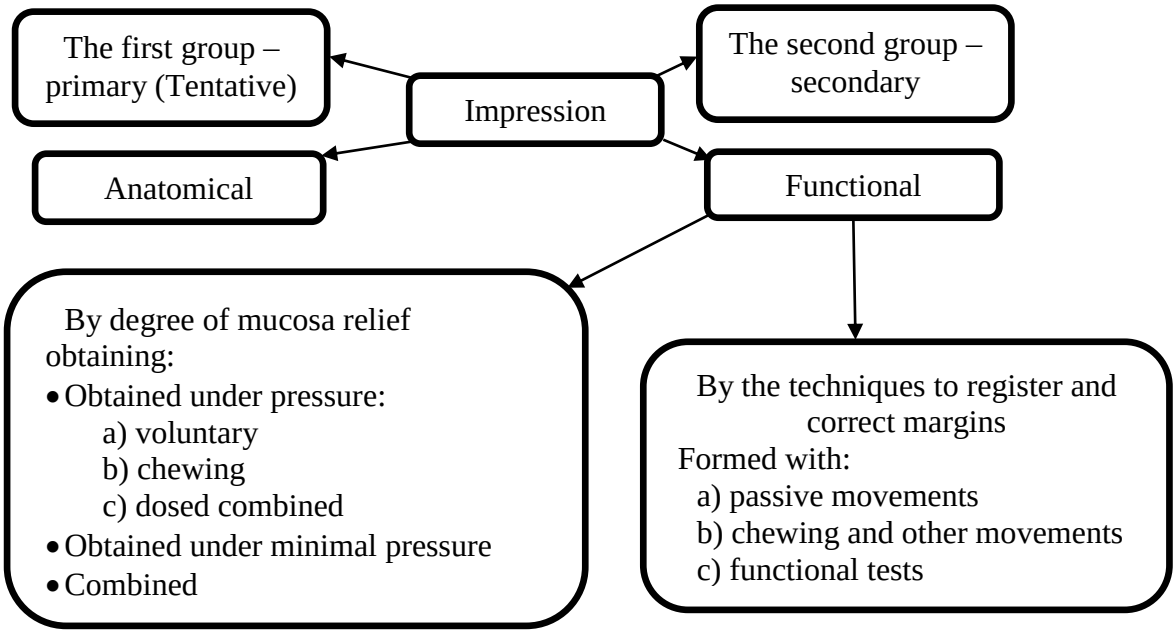
The spectrum of issues on providing orthopaedic correction for edentulous patients the impression taking procedure places an important role.

It is known that all the anatomical and physiological characteristics of the bone frame and mucosa of the foundation area should be thoroughly examined and the accurate and detailed impression should be made since this will greatly influence the proper denture fixation and stabilization and the distribution of chewing pressure over denture base during the denture functioning.

Among the number of techniques recommended for full denture fixing, the biophysical technique is considered as the most effective. This method is based on applying physical phenomena of adhesion sand functional suction to obtain the impression of foundation area tissues and its margins in order to fabricate the denture, which base would perfectly fit the relief of the anatomy of the foundation area and to achieving the best possible valve effect by overlapping the neutral zone. However, proper functioning of the valve is possible only when the denture margins are in close continuous contact with the mucous membrane of valve area. Topographic characteristics of valve area are very specific and can considerably vary from person to person and depend on the number of anatomical and functional characteristics of the bone frame and foundation area mucosal relief. The functional impression should show the peculiarities of denture-bearing area when jaws are tightly closed and without it. Making accurate and detailed functional impression is the ways to fabricate perfectly fitting denture. Functional impression shows the size and shape of the denture-bearing area as well as registers mucosal resilience and forms functional margins of a future denture when in function.

The first technique for taking functional impression was developed in 1864 by Schrot, but due its complexity it failed to become commonly used.

Among the most common impression classifications there is the classification offered by E.I. Gavrilov. The author divides the impressions into two groups.



A.I. Betelman has found out proper functional impressions, when their margin ends in the neutral zone, and functional suction impressions, when the margin overlaps the neutral zone for 1-2 mm towards the placeable mucosa.

At the dental office, we should take only functional-suction impressions. In all clinical conditions of the edentulous jaw, the functional impressions should be made by using custom trays. Impression materials are metal, thermoplastic masses (e. g. wax), plastics, photopolymers, thermoplastics, etc. Custom trays can be manufactured directly at the patient's chair or in the dental laboratory.

When making tray in the laboratory, anatomic impression is obtained, from which a model can be cast. In the model, the margins of future trays are then outlined and they have to reach the passively placeable mucosa. The model is covered with insulating varnish "Izokol". Required amount of plastic is mixed and applied onto the model to and along the defined margins.

Impression is taken under the patient's performance of active functional movements. The first functional impression is finished when the material is set, Small amount of the plastic mixture is used to make handle about 1-1.5 cm in size. Then the tray is carefully shaped with cutters and carborundic stones to get margins fitting the model. The thickness of the tray margin should be at least 1.5 mm, because when the tray margins are a very thin, it is difficult to obtain sufficient volume of impression margin. The trays do not become deformed in the mouth and in case of failure of taking impression, the procedure can be redone.

As it can be concluded from the classification by E.I. Gavrilov, the margin of functional impression can be formed in three ways: through passive movements, by functional movements themselves, and by functional testing. Full range of functional tests for forming the tray margins and functional impression was first proposed by Herbst in 1957. Later, similar procedures were worked up by Boyanov, Langer, and Zinhler.

However, whatever the technique was used to manufacture a custom tray, it always require correction before making an impression. Custom tray for the upper jaw is corrected in the following way. First, fraenulum of the upper lip and cheeks should set free, forming for them slots along the margin of the tray. Then the tray margins should be checked by alveolar tubercles. A reference point for determining the tray margins is the place of attachment pterigomaxillar fold to the upper jaws, and this fold should not be overlapped with the tray. At the same time a vibrating line and topography of blind orifices should be detected and the tray edge should overlap the vibrating line for 1-2 mm. Then, in order to precisely detect the tray margins, Herbst tests are applied (Fig. 18).

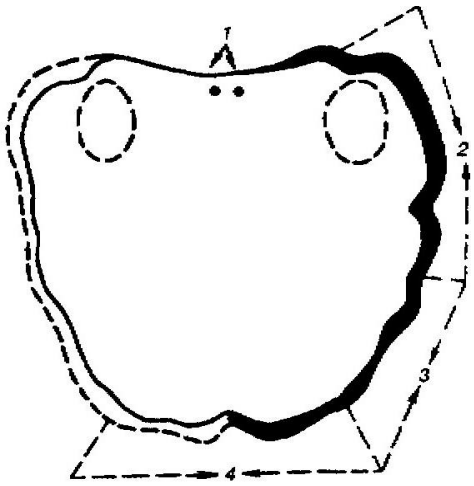


Fig. 18. Correction of a custom tray on the upper jaw by using Herbst tests. (explanation available in the text)

1. Wide mouth opening. When the tray shifts, its margin should be shortened in the area (1).

2. Cheek suctioning. When the tray shifts, then its margins should be shortened in the area of buccal-alveolar folds (2, 3).

3. Putting lips a tubule. When the tray shifts, its margins should be shortened in the front section (4).

Please note that the final impression of soft palate should be done in a raised position. For this purpose, thermoplastic strip of 45 mm wide should be placed over palatine area of the tray.

After the tray having been corrected, the impression is taken from the edentulous maxilla by using silicone masses. The impression margins are formed with using the same tests used for correcting tray.

Correction of a custom tray on the lower edentulous jaw is performed as follows. First, lower lip frenulum, lingual frenulum and buccal alveolar-folds should set free, making the slots in the tray margins.

Reference points for determining the distal margins of trays are mucous tubercles. They are covered with tray partially or fully, depending on their shape, location, consistency, presence or absence of painful sensations on palpation. Along the lingual lateral margins, the tray should overlap the mandibular-hyoid line, when the last is rounded, or comes to it, when the line is sharp. When there is mental spine and mandibular ridges in the anterior part, the alveolar tray should overlap them, leaving free the excretory ducts of sublingual salivary glands. Further correction of the trays is conducted by using Herbst test (Fig. 19).

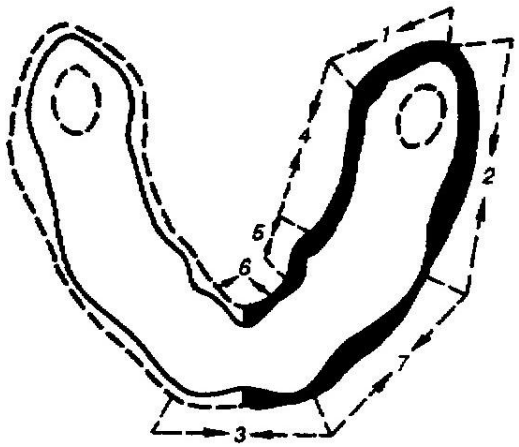


Fig. 19. Correction of custom tray on the lower jaw using Herbst tests (explanation available in the text)

1. The patient is asked to swallow saliva. When the tray is displaced, its margin should be shortened behind the mucous tubercle towards oral sublingual line (1).

2. Then the patient is asked to open the mouth slowly. When the tray rises backward, it should be shortened within the area from tubercles to the place of the second molar to be (2). The tray can be quite close to the tubercles, but they will never be left free. When the tray uplifts in its anterior part, then its margin along vestibular side is grinded in the area between the teeth (3).

3. The patient is asked to move with tongue tip along the low lip vermilion. When the tray is raised, the margins running along the jaw-hyoid line should be cut (4).

4. The patient is asked to touch to the cheek with the tongue tip when lips are parted. The place to be corrected is located within 1 cm from the midline of the sublingual tray margin (5). During the movement of the tongue to the left, correction may be required on thee left side, and vice versa.

5. The patient is asked to move with tongue tip along the upper lip vermilion. Tray margin may be corrected inside at the level of the frenulum (6).

6. The patient is asked to move facial muscles vigorously and to put lips forward. When the tray uplifts, it is necessary to shorten its outer margins between canines (3).

Moreover, along the vestibular margin of the tray between the canine and the second premolar there is a place where its margin is pushed up. This can be checked by placing index fingers just below the oral commissures and performing massage movements without pressure. At this point, tray margin is perfectly felt as too deep (7).

Tray margins are specified by thermoplastic masses ("Ortokor" "Suprafiks" et al.). Then, the functional impression relevant to clinical peculiarities is made up of impression materials.

At the same time, it must be emphasized that functional tests have some drawbacks. The fact is that the vibration amplitude of various placeable

tissues at the edge of the prosthesis is different, while functional tests are standardized. There fore further search for improving tests for various types of edentulous dentures. However, to apply functional tests on the lower jaw with such precision as recommended by Herbst is impossible after narrowing the foundation area. Probably tests should be carried out when lips are parted and under a reduced range of vibration amplitude.

Among the tests used to take function impressions, Herbst tests are known as the most worked out. But even they can not be representative of the full amount of chewing and other functional movements performed by the mandible and are not consistent with the phases of chewing movements by Gyzi.

Forming the margins of impression involves mainly those placeable tissues, which move the lips and tongue. At the same time, chewing and swallowing movements do not actually affect the impression. Phonetic tests involving mandible movements are not applied as well, though the full denture functioning is connected with those movements. As a result, the functional status of soft tissue movements during chewing food, speaking and swallowing does not affect the impression.

Therefore, the finished denture base manufactured by the Herbst techniques does not correspond to the optimum margins.

Therefore, the idea of impression margin formation directly by the patient during chewing, swallowing and performing other functional movements by the mandible is still relevant.

M. I. Piasetskiy (1983) developed a device (fixator), which enabled to take functional impressions in the conditions of mandible functioning. This device consists of custom tray, on the upper surface of which there are supports with holes for fixing the upper end of the elastic element, and of mental sling having an element, into which the lower ends able to move are built up. Elastic elements are fixed by screw. Custom tray and submental sling clamp lower jaw, which is a rigid element. When moving the mandible, the ends of the elastic element remain fixed and provide a reliable, irrelative to the atrophy extent of the alveolar process, custom tray fixation that enables wide range of mandible functional movements.

The proposed clamp holds custom tray during any movement of the mandible, both during its correction and the process of functional impression taking.

However, the complexity when operating with the clamp described impedes its wide application.

Depending on the clinical conditions for taking impression, prosthodontist should have a wide variety of impression masses in order to choose those, which are the most suitable for the certain goals.

According to the classification impression masses, I.M. Oksman distinguishes the following groups:

1. Crystallizing masses, i.e. those which get hardened in the mouth (zinc oxide eugenol pastes, plaster of Paris);

2. Elastic masses (alginate, silicone, Tiokol). These mass become flexible after polymerization;

4. Thermoplastic mass, which get hardened in the mouth but they are plastic when warmed up ("Stens" Thermomass "MST-2.3 "'Stomaplast" "Ortokor" "Dentafol" et al.).

The experiment has demonstrated that different impression masses can press mucosal foundation area in different ways: alginate masses by 20%, silicone, tiokol, zn-eugenol by 40% - 60%, and thermoplastics by 80%. Qualities of the dentures, their fixation have shown that among the best masses are those, which compress underlying mucosa by 50% of their compression capacity ("Sielast" "Tiodent" "Dentol" "Stomaflex" "Syloflex" etc.).

According to the classification by E.I. Gavrilov, there are impression materials different by their properties to be adjacent to the mucosa: compression, decompression and differentiated impressions, or combined.

Regarding the appropriateness of applying compression and decompression impressions there are different points of view. Rumpel considers that the mucosa during the procedure of taking impression should be kept in conditions similar to those under the denture base during chewing and thus assumes reasonable to take compression impressions. Spreng and Haypi share this opinion.

Wild and Kemeni are opponents of using compression impressions. They believe that dentures made by this method, constantly put pressure on the foundation area tissue, causing them to atrophy. There is a third group of authors (Betelman A.I., Oksman I.M.) that do not prefer a particular method of functional impression making, and select it depending on the specific conditions in the mouth.

Decompression impressions, in their opinion, are recommended in low-pliable mucosa, especially in cases of torus, exostoses, while compression impressions are quite good with well-pliable mucosa.

When placing dentures to edentulous patients, it is important to assess the state of mucosal foundation area on the edentulous jaw. Knowing the structure of the mucosa, its compliance is important not only for selecting the best technique for taking impression and impression materials, but also for preventing the harmful effect of the prosthesis onto the supporting tissues.

For the first time, the phenomenon of compliance of the mucosal foundation area and its practical implications for dental prosthetics was described by Suple. He proposed a classification of mucosal pliability, whereby he distinguishes between four classes: first class was characterized by moderately dense pliable mucosa and high alveolar ridge; second - thinned, atrophied, low-pliable mucous membrane that covered the lower alveolar ridge; third - loose mucosa with low alveolar ridge; fourth – presence of wrinkles and movable "wobbly" ridge.

It is extremely important to ensure optimal conditions for the fixation of dentures depending on different nature of mucosal foundation area and the

question of how to take the best impressions of soft tissue foundation area: at rest, when compressed or partial unloading is quite relevant.

Method of finger irreversible impression is to apply custom perforated trays fluid impression materials ("Dentol", "Repin") and a minimum pressure.

Method of finger irreversible impression reduces the application of strict custom trays thermoplastic mass and high pressure. Compression of mucosa performs various methods: continuous pressing impression tray handy device or a special power chewing pressure.

The basis is an irreversible impression on the principle of selective pressure on the supporting tissues depending on their functional endurance. Areas with mucosa with a distinct susceptibility get under pressure and had pliable - with unloading. This is focused on the direct preparation of custom tray (tray isolated on the areas to be unloading and punching them before obtaining the final impression).

Common use of irreversible impression loosely compliant with mucosa, decompression - with atrophic, thinned, little pliable mucosa and differentiated - with uneven pliable mucosa in the presence of bony protrusions moving alveolar ridges like.

However, the use of the above techniques in different conditions atrophy of alveolar processes is not always possible to get highly functional results. This is due to a number of shortcomings of the same techniques. Thus, most authors recommended various methods for functional impressions (impressions except under chewing pressure) involve forming of the edges of an impression in the open mouth. This soft tissue neutral zone change their shape and location of the bone relative to the base. Resulting in the formation of an impression edges of the so-called functional movements do not come out of central value and held in the stretched position of the movable mucosa.

Therefore, some authors (Tpebych, 1928; I. Schreimaktrs, 1960; C. Farvis, 1974; K. Nakki, H. Siirila, 1976; R. Musil, 1979 and others.) believe that the correct position of the soft tissue on the impression get only when it obtained his mouth closed when no external influences have no effect on the position of the soft tissues, i.e. in conditions as close to natural conditions for the functioning of the masticatory apparatus.

During the construction of complete dentures should be provided not only optimal fixation and conditions contact and mucosal foundation area with denture base, i.e. chewing pressure when the prosthesis is distributed as evenly across the prosthetic box. Electromyography study of masticatory muscles in people with complete loss of natural teeth indicate a functional asymmetry masticatory muscles dependent limitation loss of teeth, by the usual use of natural teeth, and later - and dentures.

Therefore, solving the problem of uniform distribution of pressure during chewing bases full dentures must take into account not only the state of the mucous membrane of compliance, but also functional asymmetry factor chewing muscles, condition of the joints.

According to given disadvantages in obtaining finger impressions, we recommend that the sharp atrophy of alveolar processes receive compression

and decompression impressions a closed mouth in the position of the central relation.

For that purpose, the first visit of the patient to the prosthesis thoroughly examine tissue foundation area, determine areas in need of relief, and then get full of finger impressions for making anatomical custom trays. Previously on model outline areas that are subject to discharge, and cover them with a plate of lead foil. Trays made of carboplast are fixed with stens pins. It is necessarily to add 1/3 volume of quartz sand in stens of the upper platen.

On the second visit the tray is adjusted by Herbst trial and occlusal surfaces are individually formed. Work start with the upper platen (the height of the upper platen construction prosthetic plane formation vestibular surface). Then determine the height relative physiological rest and central value and begin to work with the lower platen. The lower platen to a height of approximately cut relative physiological rest, that is a central value increases to 1,52 mm (This increase is supposed to grinding rims).

Upper and lower occlusal ridges are formed depending on the severity of the Christensen phenomenon. The patient was nominated jaw forward, while between the rims in the side area there is gap wedge shape. To replace the gap between the rims injected with soft stens balls that positioned and fill the gap. When you move the front rims of the central occlusion crack appears in the front section. In order to achieve closure rims across the gap from the upper rim in the region of molar the excess amount of stens is cut in a wedge-shaped of appropriate size.

After achieving a uniform, dense and simultaneous closing ridges across the surface mount custom trays tape width Ortokor 4-5 mm. Then the patient begins grind in stens rims, performing various anterior-posterior and lateral movements for 15-20 min., While grind in lower to the upper platen to the height of the central relation. During the grinding rims reach the final formation of the custom occlusal surfaces allowing for the condition of joints and masticatory muscles functional asymmetry and conduct functional specification of custom territories using trays Ortokor. Further, custom trays in areas of isolation and perforated by a bur and repin, the impressions are obtained under the pressure of chewing bite in the central state relations.

Assessing impressions the tray with reflections is injected into the patient's mouth and asks to close custom ridges formed in the position of central occlusion. State of central value is fixed by fixing rims between a preheated metal clips. Rims draws and impressions from the upper and lower jaws derive from the oral one unit and transferred to the dental laboratory, where both models are cast and fixed in a state of central value in a simple hinge occludator. Setting the teeth arbitrary is carried out considering the existing of occlusal curve. Further manufacturing of complete dentures is carried out by conventional methods.

This technique allows the manufacture of dentures:

1. Obtain impressions in conditions as close to natural conditions for the functioning of the masticatory apparatus because they create a closed

mouth in a position of central occlusion, resulting in impression displays really functional placement of soft tissue;

2. Achieve efficient allocation of chewing pressure at the time of receiving an impression because not only takes into account the susceptibility of the mucosa, and functional asymmetry and masticatory muscles;

3. Functional draw the edges of custom tray and get the exact margins of an impression;

4. Get impressions from selective reflection of soft tissue foundation area;

5. Determine a central value of hard trays, bases and rims, thus avoiding errors at this stage;

6. Conduct functional setting of teeth using for this purpose arbitrary formed occlusal curves;

7. Reduce the number of visits in the manufacture of complete dentures;

8. Reduce to a minimum the number of corrections.

As already stated, Herbst sample is profitable only for functional finger impression stored on the alveolar ridge, but it is ineffective in challenging clinical settings with full atrophy of the alveolar part, especially in the lower jaw. Create a locking valve is unable rare. Furthermore, conventional methods of functional design impression do not provide the prosthesis. Therefore, it is often not completely fill the space that was released after tooth extraction and dental disappearance alveoli (prosthetic space), and the polished surface of the prosthesis does not match the topography of the tongue, cheeks and lips, resulting in displacement of the prosthesis during function.

Therefore, the ideal would be the fulfilment of two conditions: 1) prosthesis fills in the entire space; 2) its polished surface must meet the surface of the surrounding tissues. In this case, the net force applied to the prosthesis of tongue and labial sides must be equalled zero.

M. A. Napadova and A. L. Sapozhnykov (1964); P. Tanrykuliev (1975) offer not only receive a functional-sucking mark, but also impose a material on the outer surface of the prosthesis or trays and thus simulate this surface denture base. This method is called functional and tonic by M. A. Napadova and A. L. Sapozhnykov and the impression materials of prolonged action "Ortokor" is used for this purpose.

3D modeling is a method called by P. Tanrykuliev. This method was complemented by H. L. Savvydy. First, get the functional impressions from the upper and lower jaws, define the central value, teeth set-up and perform design check dentures. Basis lower prosthesis is made of plastic; it is not produced from wax. After checking the design of the prosthesis prosthetic upper end manufacturing, and later all the attention focus on the bottom. The surface of the lower base (external and adjacent to the mucosal foundation area) is covered with a layer of silicone or tiokol impression masses. Dentures are injected into the mouth and ask the patient without considerable effort to squeeze teeth in central occlusion position, pressing this time cheeks

and lips to the prosthesis. The functional tests are then repeated: the patient should move his lips back and forth, raise the tongue to the middle of the palate, and then with little effort rest on it in the palatine surface of the upper incisors.

After 2-3 minutes, the base is removed and examined. If you find a place, where a paste-rayed basis, the basis of these points should make thin and then apply a lot of impression and you should repeat the above procedure. After clearing the surface of artificial teeth from excess of paste, the basis with artificial teeth plaster in the cuvette the opposite way. After melting the wax base is removed, a form is filled in new plastic and the manufacturing of prosthetic is finished with conventional method.

Dentures made by this method, look heavier than those produced by reflections by Herbst tests. However, this disadvantage is offset by better fixation.

Patients with complex conditions for prosthesis foundation area on the lower jaw, which is unevenly atrophied alveolar ridge areas covered with pliable, moderate or non-movable mucous membrane, must be very careful approach to obtaining an impression function. In the case of excessive thin of mucus there are damages of its base of prosthesis during chewing, while overly compliant press out its difficulties in obtaining an impression function during functional loading.

To achieve reliable fixation and stabilization of complete dentures is very difficult. In this connection, special importance is the quality evaluation of anatomical and physiological characteristics of the bone base and mucosal foundation area.

L. B. Yerys proposed the method of functional chewing impression under pressure with considering of compliance of mucosal foundation area (on the upper jaw are 25 areas; on the lower jaw are 24 areas).

Upon receipt of an impression anatomical plaster cast model according to which draw plots measuring compliance and the data is transferred to the model. Depending on the compliance mucosal areas on the model mark chemical pencil varying intensity, mark most intense area of low-pliable mucosa.

Hard-trays of custom bases of material light-curing «Individo Lux» of "Voco" company are formed on the upper and lower jaws. This material combines the positive properties of wax and plastic. Tray compresses on models without undue effort. In the area of fornix, vibrating line and in areas of expanding the boundaries of the prosthesis even leave a distance of 1,52 mm between the model and tray. This condition is due to play on the functional state of the impression soft tissue is not linear, and volume. Sharp tray tool is used for cut-defined margins.

Finally, tray-shaped bases on models for curing for 5 minutes placed in a light fitting halogen polymerization "Individo Light Box". On the outer surface of the tray spikes create further accommodation wax rims (Fig. 20). In the prepared tray bases paste wax rims height12 mm and width 8 mm. On models chemical pencil mark the foundation area in need of relief when

receiving an impression function and copy them to the internal surface of trays, bases. To determine the areas of trailers used data compliance mucosal foundation area, got on the first visit. To avoid direct pressure on custom non-movable mucosa tray-make thinner bases and perforated. On areas of custom trays are shaded slightly, a thickness layer in 1 mm is removed and on areas that are heavily shaded, except the perforation is performed by small drill on grind layer with 1 mm. First, make laxative dents and grooves in areas particularly thin, non-movable mucosa. Then these areas are perforated several times.

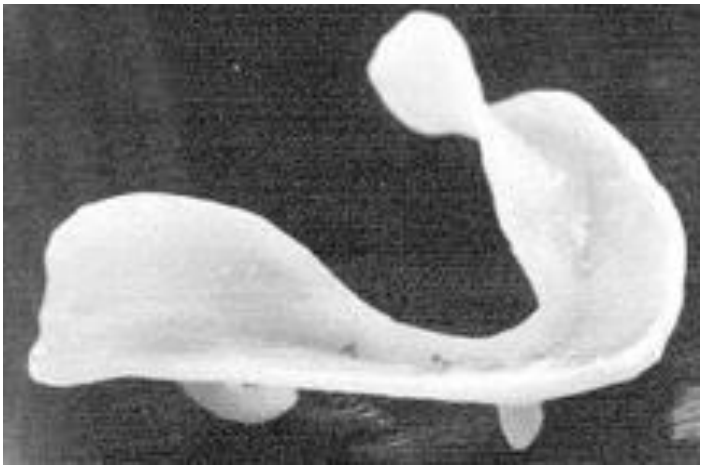


Fig. 20. Tray-formed custom basis with spiked rim for bonding wax

The highly differentiated functional impressions under chewing pressure are received with custom trays-bases.

The feature of receiving functional Impressions on our technique is that they receive between determination and fixing of the central relation. Before receiving function impression in the semi-opened mouth, verify the accuracy of the boundaries of custom trays, bases with B. Boianov (1964) samples. After checking that the tray-base is well defined in toothless jaws, are functional chewing impressions under its own pressure. To do this, first introduced in the mouth tray-bottom base with no impression materials, and then filled with impression material ("Stomaflex" "Sielast") top-tray basis and ask the patient to bite. At the same time, see to so that wax rims tightly meshed the central parity jaws. The patient was offered to perform active movements of the muscles of the lips, cheeks, tongue, thus mimicking chewing movements.

Lower impression tray-base is removed from the mouth after hardening mass. It fills the impression materials and re-injected into the mouth, asking the patient to bite again. Besides movements of facial muscles, the patient turns left and right tongue touches the inner surface of the wax cylinders in lateral areas tongue rests on the palate.

Before removing from the mouth trays, bases of functional impressions it is necessary to check how the height of bite is increased by impression materials. At this height, fused wax of the upper and lower rims bite to the

level previously determined the height of the central occlusion. Of course, the difference is no more of a millimetre, which does not affect the intraocclusal certain distance.

Creating a locking valve on the toothless lower jaw is difficult. According significant atrophy of the alveolar ridge moving soft tissues, which are located on the vestibular and oral surfaces alveolar arch, almost merge at its apex. Because of this narrow strip on intact alveolar ridge retain complete denture is practically impossible.

Therefore, foundation area boundaries extend to not only subordinate moving tissue, but also pear-shaped space. Seating retention in this area of the lower jaw is not the only one. Equally important is the space (of varying depth and length) located below the internal oblique line. Despite the clear need for these spaces for holding the prosthesis, in practice they are not taken into account. Mostly it depends on the quality of an impression function, and hence making the correct adjustment and custom trays that can be shown on the impression size of these spaces are significant.

On this basis, to improve the technology for functional Impression taking into account custom features of the construction of the mandible for "adverse" anatomical and physiological conditions in the mouth, we proposed a method of making custom tray on the lower jaw.

We made full dentures lower jaw using custom trays light-curing material "Profibase" of German company "Voco". Method of production of custom trays follows: for full anatomical plaster cast, reflections working models, which outline the boundaries of custom trays and parallel surveyor to locate the internal oblique line.

Therefore, the internal oblique line above the lingual surface of the body of the mandible, its elongated overlapping denture base will lead to formation of a niche between the edge of the prosthesis and jaw and give the possibility to form a locking valve. To display this plot on the impression, the edges of custom ray should not be shortened. Their length of sublingual space is defined during adjustment.

Vestibular limit of custom trays should cover the neutral zone at least 23 mm.

To produce rigid custom trays with light-curing material should wring out plate by model, not excessively. In the area of fornix and in the areas of expanding the boundaries of the prosthesis in cases of well-defined internal oblique line display for the best functional status of soft tissues tray should retreat from the model to the 1-2 mm especially by the tongue. Sharp instrument to cut off the tray marked boundaries. Formed tray on models polymerized in light-curing installation within 5 minutes. Further laboratory of manufacture tray performing technology provided material manufacturer's instructions.

All surfaces of custom trays before their admission to hospital should be treated for preventing mechanical trauma tissues of the mouth.

Then a chemical model of a pencil point out areas that need to unload when receiving an impression function. To determine these areas using data compliance mucosal foundation area got on the first visit.

On receiving outpatient, custom trays correction is carried out taking into account the functional state of muscles involved in the implementation of all movements. For this, functional Herbst tests are used in B. V. Svyryn modification.

Particular attention is paid to the long edges of the tray in the area of internal oblique lines, conducting functional tests for moderate movements of the lower jaw and tongue.

Thus, obtaining an impression quality functional mandates the consideration of the state of atrophy of the alveolar processes of the upper and lower jaws, compliance mucosa, muscle balance area, retroalveolar and pear-shaped zones allowing the use of a wide range of impression materials depending on the clinical picture.

However, properly prepared functional impression does not only provide reliable fixation of full dentures, but also need to stabilize the correct definition of the central value and setting artificial teeth, taking into account the laws of articulation.

Part II

METHODS OF DETERMINING OF THE CENTRAL RELATION IN EDENTULOUS PATIENTS

The central position of the mandible in the space defined by closed facial skeleton in central occlusion dental series. However, without teeth - heads of the lower jaw, occupying symmetrical holes in the joint, the most relaxed back position, even when possible lateral movement of the mandible. Value upper and lower jaws when the latter is in a central position, also called central.

Methods of determining of the central relation in edentulous patients

There are three methods for determining the centric relation classic CITO, gypsum blocks, lapped pins.

The most common method is classic CITO.

After functional mount the impressions are transferred to the laboratory, where they are cast in plaster models. To determine the centric relation made of wax bases wax rims. Their height in the area of the front teeth averages is 1.5 cm and in the area of the last molars is 0,5-0,8 cm. When significant atrophy of the alveolar ridge is observed the height of wax rims can be increased. Bite lowering the rims towards the last molar because the crowns of natural teeth in the direction of the incisors to molars gradually reduced. Therefore occlusal surface ridges form should be given equal plane, and the angle between it and buccal (lingual) surface must be clearly defined.

Determine the relation of central jaw if teeth-antagonists easily. Make it difficult, if lost all his teeth. In the first case is limited to the identification and registration of central occlusion of teeth, the second is necessary to determine the most advantageous position functionally jaw in three mutually perpendicular planes: frontal, sagittal and horizontal, without these guidelines. Naturally, the increasing complexity of the task increases the likelihood of errors. The vertical size of the jaws define the central value in the frontal plane, the front-rear position of the lower jaw - in the sagittal and transversal - in the horizontal plane.

Before you define the vertical size relation of the central jaws - occlusal vertical dimension should be well explain the significance of this procedure, the possibility of errors and their probable impact on the outcome of prosthetic treatment. Each error causes some functional and morphological violations are typical symptoms. Thus, there are increasing of occlusal vertical dimension knock your teeth while eating, and sometimes speech, chewing muscles fatigue.

The clinical picture is distinct in the case of reducing of occlusal vertical dimension. Reducing of the distance between the toothless alveolar ridges, fixed dentures, is accompanied by a decrease vertical size of the lower third of the face. The upper lip is thus shortened, nasolabial folds become

deeper, sink corners of the mouth and face of man seem senile. Often there is a maceration of skin in the corners of the mouth. Reducing of occlusal vertical dimension function is associated with lower dentures that were brought chewing tests (L.M. Perzashkevych). Along with a reduction in the distance between the upper and lower jaws decreases own mouth. For this reason, the movements of the tongue are slowed, the speech is disturbed, patients complain of fatigue of masticatory muscles.

Reducing of the occlusal vertical dimension leads to changes in head position of the mandible in the articular fossa. She shifted deep into the pits and back thicker layer of articular disc presses on the neurovascular bundle, which comes with a rocky-drum (Hlaser) slot. From this can cause pain in the joints. Some clinicians shift to explain the emergence glossalgia head, hearing loss, and others. Errors in determining of occlusal vertical dimension affect the design of dentures. By increasing its dentures are massive for understatement - low, with short ugly teeth.

Definition of central value in prosthetic toothless jaws consist of training wax rims, definition of occlusal vertical dimension, the central position of the lower jaw, causing rough lines on wax rims and finally sealing rims models bite the central parity jaws.

Preparation of wax rims

In preparation of wax rims hold the following operations: 1) clarifying the margins of wax patterns; 2) formation of labial surface and the thickness of the upper rim; 3) determine the height of the upper wax rims; 4) forming a prosthetic plane.

Specification of wax rims margins is to eliminate obstacles to his prosthetic fixation on the areas and prevent deformation of the upper lip. To do this, check all boundaries wax pattern, freeing him bridles lips, cheeks and tongue, side folds of mucous membrane folds pterygomaxilar and sometimes shorten the basis of the vibrating line.

Formation of vestibular surface and the thickness of the upper rim in bite anterior dictated by the circumstances. Atrophy of the alveolar after tooth loss is not the same everywhere. Thus, on the lower jaw the bone is thinning primarily from the top and lingual surfaces of the alveolar ridge. The upper jaw, on the contrary, decreased bone mainly from the top of the ridge and its vestibular surface. Alveolar arc thus narrowed, deteriorating conditions for the raising of the teeth, and in the anterior upper lip, retraction occurs, giving the face senile appearance. Therefore, wax rim in the anterior maxilla must make to reflect changes alveolar bone that occurred. To appearance the patient had recovered, sometimes it is not placed on alveolar ridge bite arc, and it is necessary to increase its vestibular surface in the anterior section (Fig. 21)

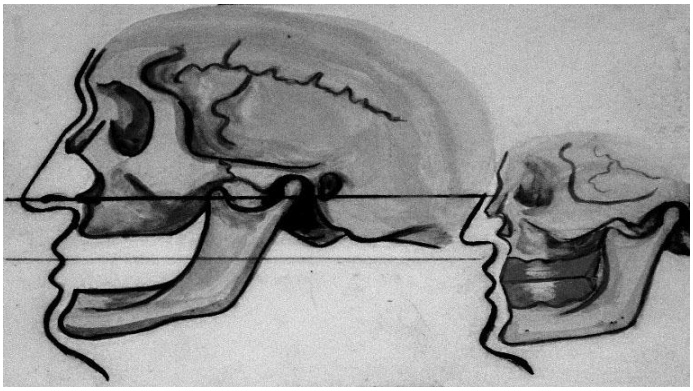


Fig.21. Value of upper and lower jaws after complete tooth loss and recovery of wax rims

According to relevant regulations, determine the height of the upper wax rims. Cutting edges of the upper central incisors closed mouth coincide with the line closing lips, and when broadcasting their edges protruding from under the upper lip for 1-2 mm. The man is older, if the smile cutting edge of the upper incisors is not visible. In view of this and determine the height of the upper wax rims. After entering a pattern in your mouth, close your lips ask the patient. In this position, to put a rim closing lip line (2) and through it establish its height. If the edge of the rim is below the line closing (3), it should shorten if the above (1) - to build a strip of wax (Fig. 22).

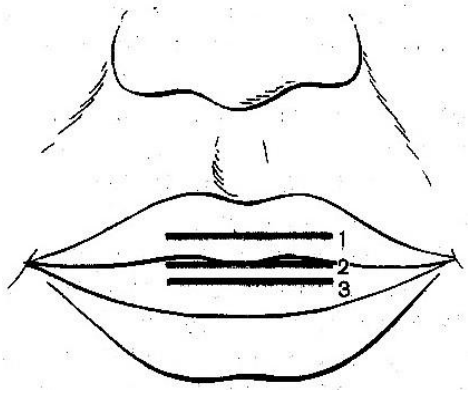
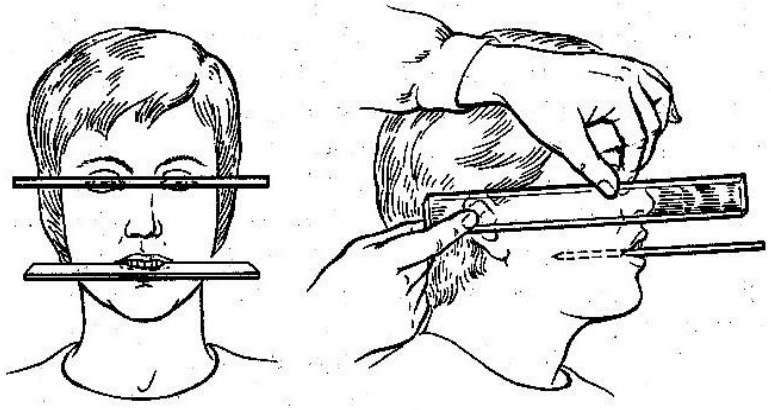


Fig.22. Position of upper occlusal ridges relative to the upper lip (scheme). Clarification of the text

Then check the height of the rim in the half-open mouth. In this case, an end to its 1-2 mm should act from the upper lip.

After determining the height of the upper wax rims should bring it in line occlusal surface of pupillary line. To do this, take two lines. One set on the occlusal surface of the rim, the second - on pupillary line (Fig. 23, a). Parallel lines indicate the accuracy of the occlusal (prosthetic) plane in anterior wax rims.



a b

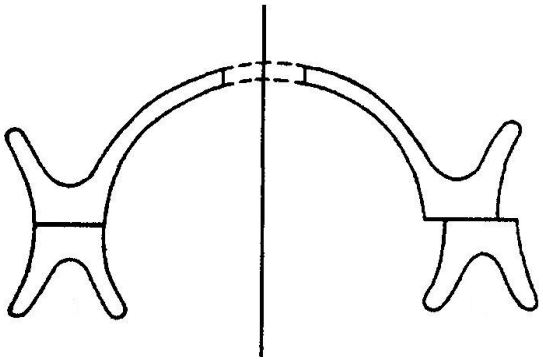
Fig. 23. Validation of correct formation of occlusal plane in the front sections (a) and lateral (b) teeth

Then form occlusion (prosthetic) plane in the side sections. By measuring a large number of skulls found that the occlusal plane lateral teeth often runs parallel Kamper plane, i.e., the line connecting the lower edge of the ear canal with nasal spine. On the face Kamper horizontal responsible auriculonasalisline, that connects the foundation wing of the nose with the middle tragus. Occlusal plane rim in the lateral parts should be parallel Kamper plane. To verify its direction, as in the first case, two rulers are used. One set on the occlusal surface of the rim, the other is on auriculonasalis line (Fig. 23, b). Parallel lines indicate a correct prosthetic plane. If parallelism is not, then it should be created by adding or removing wax it appropriate.

After preparing the occlusal plane upper rim, adjust relatively lower platen top. Thus making tight compression rims in the anterior-posterior direction, transversal, and location of their buccal surfaces in the same plane. Correction is carried out only on the lower platen. In a well-corrected wax rims the occlusal surface tight to each other throughout. When closing the mouth while they face both in front and in the side sections. First control fit them to each other in the anterior-posterior direction. If simultaneously, closing review can be seen in the shift rim. Thus, if the compression rims held earlier in the rear portions in the front section they fall and closing later.

In addition, the violations are possible when they fit to occlusal surfaces of rims in the transverse direction, but it is much more difficult to detect. In this case, the rims in the first closing of the mouth, for example, they are facing on the right, and later are on the left. Sometimes a violation visually imperceptible, because the cylinders closed the gap between them is not found. The reason is that the pattern on one-side droops, and between them and mucous surfaces alveolar bone gap formed by the doctor sees. To identify sagging cushions, you can enter between cold spatulas. If closing rims tightly and while lying on the alveolar ridge, then enter a spatula without effort fails. If the rim on one side droops between the occlusal surfaces when entering a spatula easily detected gap.

Buccal surface of the rim should lie in the same plane (Fig. 24).

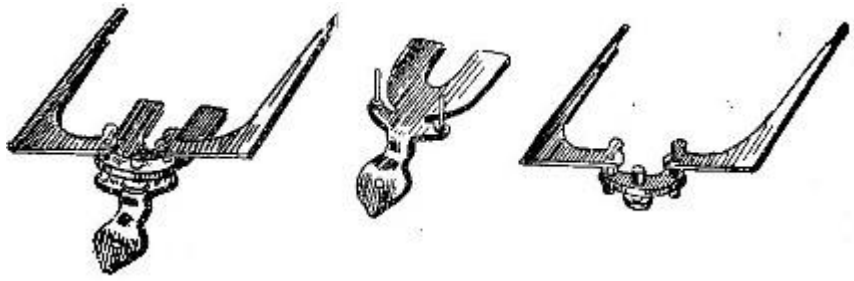


a b

Fig.24. Scheme relations bite upper and lower rims: A. rims adjusted correctly; B-rims incorrectly adjusted

Ledge occurs in the case of different widths of rims due to lower prognathy. All identified disadvantages are eliminated, and corrections are carried out only on the lower but it is not carried out on the upper. The latter is not corrected because the prosthetic plane and the approximate line will continue to serve as benchmarks for setting the teeth. Let us that just fixation of the vestibular surface of the upper rim in the lateral parts to align its width when prognathic position of the lower jaw.

Formation of vestibular surface and the thickness of the upper occlusal ridges, the height in the front-end section is important for determining the level of prosthetic plane and forms of artificial teeth. To this end use Laryn`s device (Fig .25, a). It consists of occlusal plate (b) and carriage on line auriculonasalis (c).



a b c

Fig.25. Laryn`s device

In front of the ear with a pencil mark auriculonasalis ear point line. In the upper jaw establish bases with occlusal ridges (with wax) and mark on it the cut lip. Basis of rim deduce from the mouth, is set on the model. With occlusal ridges cut remnants of wax on the cut lip, and back of occlusal ridges cut more than in the frontal part. Then occlusal ridges are cut further, while maintaining the frontal area incisive focus width to 2-3 mm. Then place in a truncated rim softened wax to impose such a way so that the total height of the rim occlusion was higher by 12 mm of abandoned incisive stop. Occlusal plate is pressed to the softened cushion in the front and rear sections, focusing on the marked points on the skin of the ear (Fig. 26).

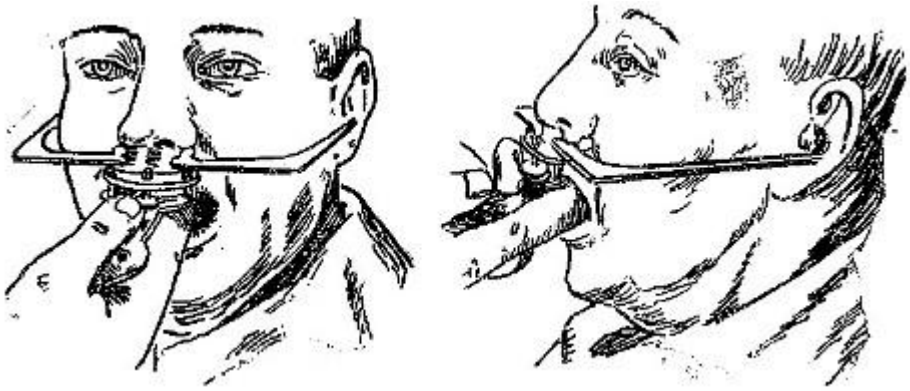


Fig.26. Moments of plane formation of prosthetic using Laryn`s device

After adjustment, wax rims defining occlusal vertical dimension.

Definition of the occlusal vertical dimension

To determine the occlusal vertical dimension is necessary to find the distance between the alveolar ridge toothless jaws that would be most convenient for the activity of muscles, joints, and would provide a better fixation and functioning prosthesis. After setting the correct occlusal vertical dimension is reduced and contours of the face. Thus, the aesthetic question provided the solution to this problem automatically.

This phase is essentially a defined vertical component of the central value jaws.

There are two main groups of methods for determining of the occlusal vertical dimension, namely static and functional (V.N. Kopieikin, 1993).

The best-known static method for determination of occlusal vertical dimension is an anthropometric. It is based on the principle of proportionality. According to Mr. J. Kurland (1955), the use of static methods gives us the measurement results to the deviation from the desired17 mm. According to research of H. H. Nasybullina, static methods for determination the relation of the central jaws is only effective in 10-15% of cases of clinical observation. S. Kalyvradzhyian (1985) established a relation between the height of the lower division of the face and the distance between the pupils. Kantorowych proposed to divide the human face into 3 and Wodswart-White proposed to divide the human face into 2 equal parts.

Zeising found a number of points that divide the human body on the principle of "golden" section, or "golden" division (Fig. 27) – division on extreme and mean ratio.

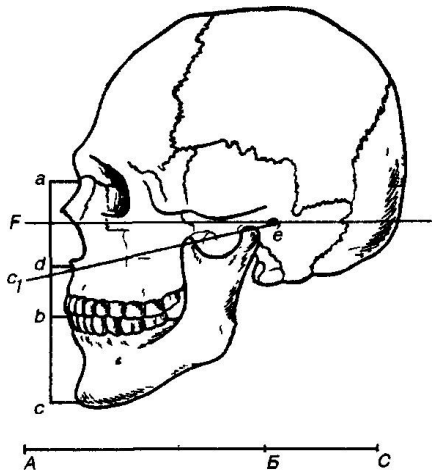
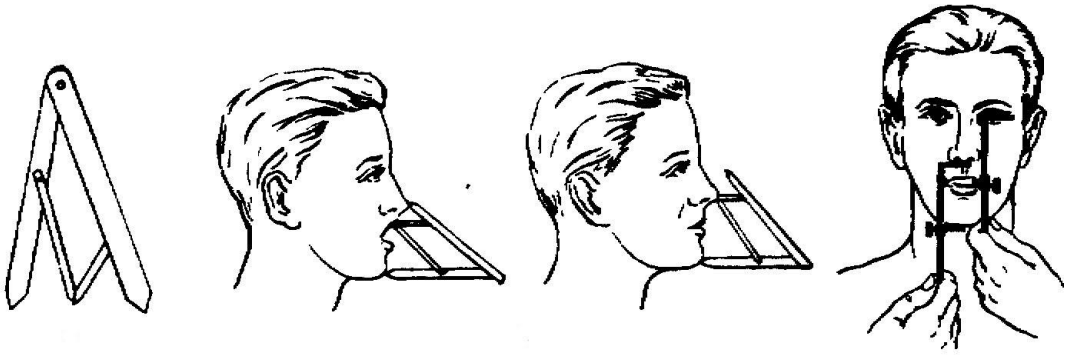


Fig.27. Focus for detection of occlusal vertical dimension by anthropometric method. The line **AC** is divided by point **B** in the extreme and mean ratio (the "golden" section), ie **AC'AB - AB BC**. In the same respect, point **b** separates the line **ac**, point **d** – the line **ab** and line **ac**, where **Fe** is the Frankfurt horizontal; **c1 e** is the nasal line

Finding these points is accompanied by complex mathematical calculations and constructions. The solution of this problem is made easier by using the Herynher compass, which automatically determines the point of the "golden" intersection (Fig. 28, a).

The device consists of two compasses connected in such a way that the legs of the large compass are separated in extreme and medium proportions. The larger segment is located closer to the hinge only on one leg and the other one is located farther from it. No matter what the distance is measured with this compass, the middle leg has always divided it in extreme and medium terms.



a b c

Fig. 28. Definition of interalveolar height: a, b – with a compass of "gold" section; c – by Wodswart-White

On the face, as noted, there are several points that divide it in extreme and middle ways. Herynher compass is used to find these points. If you ask a patient, who has front teeth, to open the mouth wide and to put leg of compass on the extreme tip of the nose (Fig. 28, b) and to apply the second one on the mental tubercle of the mandible, thus obtained distance will be divided on extreme leg and middle ways. Largeness corresponds to the

distance between the listed points, but with occluding teeth or occlusal rims. It's not hard to determine the interalveolar height by this technique.

Wodswart-WhiteBased way is another anthropometric way to determine the occlusal vertical dimension. It is based on equality of distances from the middle area of pupils to the line of lips closing and from nasal septum to the lower part of the chin (Fig. 28, c).

There are anthropometric methods of determining of the appropriate height for the classic facial profile. In the mass practice, this method of determining of interalveolar height is an inaccurate, as shown by measurements and therefore it can be recommended for practice with certain restrictions. The best results during conduction of interalveolar height are obtained by anatomical and functional method.

The evolution of methods of determining of interalveolar height goes from anthropometric and anatomic methods towards functional methods with the basement of assessment of phonetic features of swallowing function and power characteristics of chewing muscles.

The second group of methods for determining of the centric jaw relation includes functional methods, namely anatomical-physiological and anatomical-functional. In their fundamental level is the principle of one function which makes up speech, swallowing, chewing.

The methodological basis of anatomical and physiological method is the definition of relative physiological rest position of the mandible and the fact that the occlusal height less than the height physiological rest for 2-4 mm. This difference is 1-2 mm. Thus, it was established by P.M. Huzykov (1952), B.N. Bynin, A.I. Betelman (1947), I.M. Oksman (1967). The difference is from 2 to 4 mm according to A.N. Hubskoi (1954), V.Yu. Kurliandskyi (1955, 1977). The difference is from 1.2 to 2.5 mm according to H. Thiel (1951). The difference is from 1.5 to 2.5 mm by R.H. Bus. The difference is from 2 to 3 mm according to Schohn.

According to P. Ricketts (1953) intraalveolar space volume depends on the kind of bite that the patient had at the moment of teeth loss: the person with orthognatic bite is 1-2 mm, with straight bite is 1 mm, with deep overlapping in the frontal part of dentition can reach 6-8 mm and in posterior parts ranges from 11 to 13 mm.

V.N. Kopeikin (1993) considered that the freeway space is a free position of the lower jaw, when the distance between teeth is 2-3 mm and chewing muscles are a little tense.

According to L.M. Perzashkevych (1961), freeway space or lumen between the teeth in the front section in a rest position in lower jaw ranges from 1.5 to 9 mm. During investigation this distance equalled 2-3 mm in 70% of cases. 1,52 mm was in 12% of cases, 34 mm had 7%. 7 mm had person with orthognatic bite in one cases. In one case, 9 mm had person with prognathic bite.

The research results of other authors indicate the wide range data about jaw relation in the positions of physiological freeway space and central relation.

Location of physiological freeway space of mandibular has great practical importance, because it is the main criterion for the initial installation and height of the central relation of the jaws by anatomical and physiological method (V.Yu. Kurliandskyi, 1955 I.M. Oksman, 1967; E.I. Havrilov, I.M. Oksman, 1978; E.Ya. Vares, 1993; Ah. Geering, M Kunder, 1986; S Palla, 1987; A Watkinson, 1987).

Muscle tone, miotatic reflexes and passive forces that hold the lower jaw in space are determined by the freeway position of the mandible. These factors are interconnected and interdependent (N.V. Kalinina, V.A. Zahorskyi, 1990).

Koivuma (1968) identified the freeway position of the mandible in which all elements of dental system are in the balanced state.

E.I. Havrilov (1968) defined physiological rest of masticatory muscles as their stable reflex contraction, due to its characteristic spatial position of the mandible. The basis of muscle tone is myotatic reflex. Based on the foregoing of physiological essence, the author defined the state of rest as the position of the lower jaw relative to the upper, in which all the muscles that raise and lower the lower jaw are in a state of minimal and balanced tonic tension.

The literature provides contradictory information about static consistency state of physiological rest. Thus, A. Gipp (1985) indicates that the spatial position of rest mandible may change throughout life, including because of prosthetic measures. The author notes that the position of the lower jaw alone is more stable than in the central state of occlusion. At the same time, it is believed that this condition remains stable throughout life.

J. Thompson (1954) found that the position of rest of the mandible is prone to change. Author distinguished short-term and long-term changes. Short-term changes occur during the day and depend on posture, breathing and emotional state of the patient. Long-term changes occur in patients who have lost all their teeth. The lower jaw extends the upper and it is inserted in a new rest position.

D. Atwood (1966) considered that the change of the rest of the mandible is due to loss of function of proprioceptors receptors located in periodontal in patients who have lost all their teeth. The author noted that there are many circumstances that affect the rest position of the mandible. The first group includes physiological factors: volitional control of the position of the jaw, emotional state, fatigue, parafunctions of chewing muscles; the second group includes the pathological condition of maxillofacial area, namely the disease muscles, joints, disorders of the nervous regulation and others.

N.V. Kalinina, V.A. Zahorskyi (1990) noted that the rest position of masticatory muscles is a reflexive and relatively permanent condition, but, it is prone to many exogenous and endogenous factors.

L.A. Weinberg (1982) showed that the volume of interocclusal space prone to fluctuations during the day and it depends on the lips position,

neurogenic factors, age and general body condition, level of muscle tone, turgor and elasticity of the surrounding soft tissues.

D.F. Goldstein, S.L. Kraus, W.Y. Willams (1984) found that the position of physiological rest is a state of dynamic equilibrium of forces which acts on the jaw and head position change affects the balance of these forces. If the head is tilted back, interocclusal space becomes larger when the head is tilted forward the space is decreased. During inhalation, the interocclusal space is increased, with a strong physical exertion it might principally disappear.

Anatomical and functional method.

Before proceeding to the description of the method it is necessary to particularize on anatomical and functional data that they form the basis for his underlying rationale. The loss of fixed occlusal vertical dimension leads to a change of repositioning of all anatomical structure around the oral fissure, thus the lips are depressed, the nasolabial folds become deeper, the chin comes to the fore, the height of the lower third of the face is reduced.

It is necessary to keep in mind that with the proper occlusal vertical dimension the lips should lie freely and without tension, touching each other throughout in order to restore the normal configuration of the face and to create an optimum aesthetic disturbed by the loss of fixed occlusal vertical dimension. They should not be sink or strained. Slightly raised corners of mouth and marked nasolabial folds are observed.

These data at one time were the underlying of the classic anatomical method for the detection of the occlusal vertical dimension. One can change the appearance of the person restoring the relation of anatomical structures surrounding the oral fissure. This method is very good. However, the doctors can make mistakes in the determining of occlusal vertical dimension. The reason is their subjective assessment of the position of an anatomical structure. The contours of the face soft tissues often have different character which sometimes depends on their thickness, instead of the occlusal vertical dimension. These data was found by the teleroentgenography. Therefore, to determine the occlusal vertical dimension at which would have created the best possible conditions for the muscles and joints, anatomical method supplemented by more specific criteria, one of which is the rest position of the mandible.

As you know, our teeth rarely contact with their antagonists beyond speech and chewing. A this time the lower jaw is slightly lowered and there is the appearance of lumen between the dentitions from 1 mm to 8 mm and more in the great majority of people. The jaw is held in this position by the antigravity reflex. This condition is associated with the rest of the functional masticatory muscles apparatus that are in a state of maximum relaxation. The states of relative rest of the masticatory apparatus concomitant certain relation of organs that surrounds the oral fissure. The lips are independently located and the nasolabial folds are marked.

The concept about rest of mandible and the data about preoral tissue anatomy were in the basis of the **anatomical and functional method** for

determining of the occlusal vertical dimension.

The occlusal vertical dimension is determined by appropriate methods. The patient is attracted to brief conversations that are not related to the prosthesis. After this, his or her lower jaw is set in the rest position, and his or her lips are usually closed independently adjoining to each other. In this position, the doctor measures the distance between two points applied to the skin at the base of the nasal septum and chin.

Then the putty indexes with occlusal rims are inserted into the oral cavity and ask the patient to close the mouth and squeeze rims. It should be kept in mind that the occlusal vertical dimension should be measured in the central position of the mandible. Since the correction of occlusal rims occurred repeatedly opening and closing of the mouth, the patient often sets the jaw in this position. It is necessary to measure the distance again between the marked points after introduction of occlusal rims. This distance is called the occlusion height. It should be less than the height of rest for 2 -3 mm.

If the height of the lower third of the face at rest and compressed occlusal rims was the same, the occlusal vertical dimension is increased. Therefore it is necessary to remove the layer of wax on the bottom occlusal rims. If the occlusal height is more than3 mm lower than the height of rest you should increase the height of the lower occlusal rim.

After that as the occlusal vertical dimension was determined by measurements one pay attention to the tissue around oral fissure. The normal contours of the lower third of the face are restored according to the right occlusal vertical dimension. If the height is reduced, the angles of mouth are dropped, the nasolabial folds become pronounced, the upper lip is shortened. In this case it is necessary to check the results of measurements of height and resting occlusion once more. The lips are occluded with tension, the nasolabial folds become smooth, and the upper lip is lengthened during the enlargement of occlusal vertical dimension. The appropriate test is indicated regarding these changes. If you touch the closing line of lips with your fingertip, they immediately open, which does not happen if they independently lie. When the configuration of preoral tissue causes the suspicious of enlargement of occlusal vertical dimension one should check all measurements of both resting height and occlusal height again.

Speech test is the second functional additions of anatomical method. When the occlusal vertical dimension is determined by the anatomical and functional way you should ask the patients to pronounce a few sounds or syllables (o, i, m, e, p, f and etc.), at the same time you should monitor the degree of detachment of occlusal rims. When the occlusal vertical dimension is normal, the detachment reaches 56 mm (Fig.29). If the occlusal rim is disconnected over then 6 mm, you should reduce this height, and if the gap is less than 5 mm you should increase it.

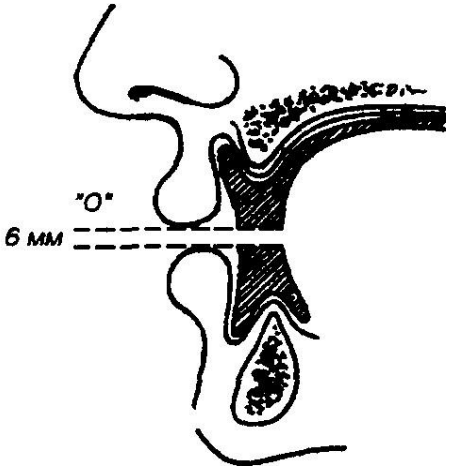


Fig. 29. Speech test. During the pronunciation of the sound "O" the gap is appeared between rims

The combination of the anatomical method and functional tests makes up the anatomical and functional method of determining the occlusal vertical dimension. It gives us better results, but also has disadvantages because the height of the gap between the teeth in the rest position of the mandible is individual in different people. Since this distance cannot be measured in every patient, they use an average value (2-3 mm).

Thus, the phonetic method is based on identifying anatomical patterns of jaw relation by phonetic samples. The value of intraocclusal space is determined at the time of standardized verbal tests, which is a benchmark for determining the value of the central jaws. According to L.R. Allen (1959), K.V. Rutkovskyi (1970), E Pound (1973; 1977), A Petrovic (1979; 1980), D Reisberg (1985), the occlusion of value gap that occurs in the process speech function is a quite variable and individual. During the pronunciation of different sounds, the intraocclusal change of the gap is observed in a wide range.

Definition of central (neutral, mesiodistal) position of the lower jaw

Determining of the central position of the mandible often turns into a difficult task, because it is necessary to push the lower jaw forward, given the tendency of patients who have lost teeth. We shouldn’t ask the patient, "Close your mouth right" to insert it in a central position. The opposite often happens, because the patient does not understand what is necessary to do. Even if the patient has all the teeth properly after the request to close the mouth, patients put forward the lower jaw forward or shift it away.

The patient tilts head a little back to install the mandibular in the central position. Cervical muscles are a strained, preventing the nomination of the lower jaw forward. Then index fingers are placed on the occlusal surface of the lower occlusal rim in the area so that both are touched to the corners of the mouth, slightly pushing them aside. B. Boianov, B. Todorov (1987), T. Topuzov (1988) described a reflex method of installing of the lower jaw in the position of central occlusion.

A.K. Nederhin (1938) proposed a functional reflex method of determining of the value of the central jaws. He found that pressure lower

jaw moves toward action. The pressure of the fingers on the area of molars of the lower jaw leads to the changes of reflex retrusal of mandible.

Then ask the patient to raise the tip of the tongue and to touch his posterior palate and simultaneously to swallow. This method usually provides the installation of the lower jaw in the central position.

Using of the swallowing reflex, some authors (A. Benagiana, M. Martignoni, 1961; I. Fayz, Eslami, 1988) established that swallowing movements are performed in the position of central occlusion. Ch. H. Gibss and et al. (1981), using the electromyography method revealed that intraocclusal distance is greatly increased if the act of swallowing muscles are involved by shoulder girdle.

Some authors recommend making a mound of wax on the upper wax pattern on its rear edge that patient should get by his tongue before him swallowed saliva, closing the mouth (Valkhof). When the patient closes his mouth and bite platens are starting to converge, deduce the index fingers, which lie on them, but so that they do not always avoided due to the corners of the mouth, pushing them.

When lifting the tip of the tongue to the palate removed reflex muscle tension, which put forward the lower jaw and it is set in the correct mesiodistal position. Repeatedly opening and closing of the mouth leads to the establishment of the reflex of the lower jaw in the correct position. Some elements of functional reflex method are still not lost their importance and they are used in clinical practice.

Electromyographic method is one of the promising methods of functional study of chewing and mimic muscles (L.A. Weinberg, 1982; I. Nielsen, A.Y. Miller, 1988). Thus, R.E. Moyers (1949) found that state relative physiological rest of the mandible is characterized by lack of bioelectric activity of masticatory muscles. L.S. Badu and et al. (1987) determined that the chewing muscles are not quite relaxed in a state of physiological rest and they have minimal tone, due to the presence of bioelectric activity of masticatory muscles in a state rest. Thus, electromyographic study is the most promising to determine functional and physiological rest of the mandible, in which muscle are minimally active that lowering its.

The closing of the mouth is performed by the described techniques, it should be repeated several times until clear right closing becomes. Patience is an important in this case.

The approximate lines (Fig. 30) are applied on the occlusal rims, namely average line, the line of canines and necks of the upper front teeth (smile line) after installing of the jaws in position of the central value.

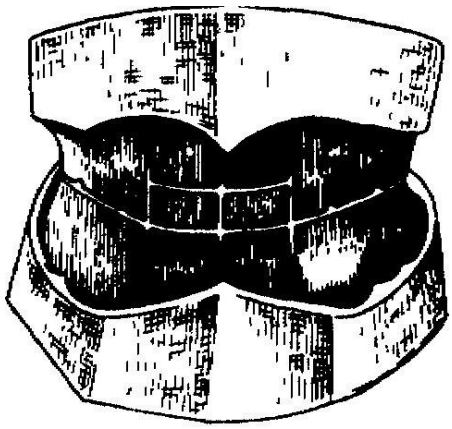


Fig. 30. The occlusal rim on models of the upper and lower jaws (on rims coated approximate line)

The average line runs between the central incisors. Proper location of this line is one of the conditions for creating smart setting outside of the front teeth. There are no precise guidelines for drawing this line. It is more convenient to apply the midline as an extension of the imaginary line that divides the face and upper lip into two halves. The line passes through the distal surface of canines that corresponds to the angle of the mouth. The line of necks of front teeth holds on the border with red border upper and lower lips while smiling. These lines define the height of the front teeth. The midline is a benchmark for setting the central incisors. The line of canines determines the width of six front teeth.

Then the rims begin to build on the occlusal surface, holding points that allow after removal from the mouth of template wax rims put them in the correct position. For this purpose, the two cross-groove depth with 3 mm is applied on the occlusal surface of the upper rim. The layer of wax with 1-2 mm is removed on the wax rim of mandible against cross sulci and a strip of heated wax is applied on a place. The patterns of rims are introduced into the mouth and you offer the patient to close them. It is necessary to use all methods that facilitate installation of the lower jaw in a central position. Softened wax gets into deposited in the grooves, a guide is created that can properly make a model. Connecting with templates derive from the oral cavity and cooled. Then it is necessary to divide them, the excess wax is removed from furrows. Sulci and corresponding them projections of wax on the occlusal surface of opposite rim allows you to connect them to the central parity. They also make it more stable connection.

In addition to determining the total height of the central occlusion further distribute this height between the future upper and lower full dentures. First, the central value is determined by CITO method. Then the occlusal vertical dimension distributes in the side sections between the upper and lower full dentures in such a way that 2/3 of the occlusal vertical dimension accounted for by the top rim (with a thickness of tablespoon) and 1/3 of the occlusal vertical dimension is on the bottom (Fig. 31).

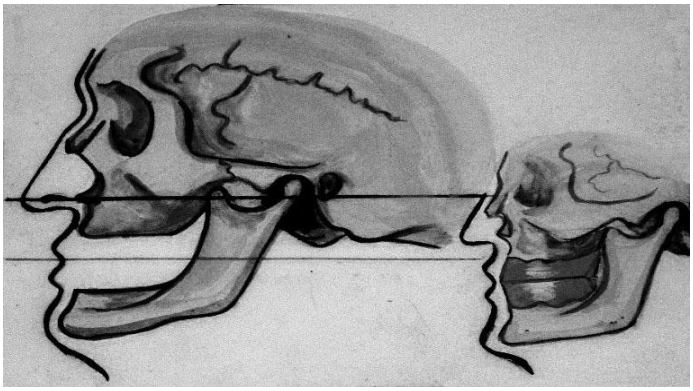


Fig. 31. Distribution of the occlusal vertical dimension between the upper and lower rims

Then the holes are drilled in the hard trays-bases at 17, 27, 37, 47 levels and the corresponding them in the wax cylinders. Then the height from the plane of the rim to the model at 17, 27, 37, 47 levels is measured by the calliper from each side separately. When you know the total the occlusal vertical dimension it is easy to calculate how many is 1/3 and 2/3 determined. The prosthetic plane is parallel to the line of pupils in the frontal area at 11, 12, 13, 21, 22, 23 levels. The prosthetic plane deviates from auriculonasalis bottom line and it looks like a smooth inclined plane in the lateral sections, beginning with 14, 24, 34, 44 levels. The wax is cut with lower wax rim in 44, 45, 46, 47, 34, 35, 36, 37 sections and it is cut on the upper rim in 14, 15, 16, 17, 24, 25, 26, 27 sections it is necessary to increase until at 17, 27 levels, the height of the top of rim with a tabletrays thickness will be 2/3 of the occlusal vertical dimension in the condition of central occlusion. The central occlusion is fixed with hot spatula in the mouth after receiving function impressions. Thus, it is impossible to fix the front or side of one of occlusions. Draw rims, drawing the middle line, canines and smile lines.

The optional step is a distribution of the occlusal vertical dimension in the side sections between the upper and lower dentures at a relation of 2: 1, it is required to reduce by 1/3 the force that throws the complete prosthesis on the lower jaw.

From the point of view of physics, a complete removable prosthesis is a physical body that is able to be in stable equilibrium or move under force applied to it. There is the general term of stability for all cases of equilibrium of bodies, if the centre of mass occupies the lowest position in comparison with all possible neighbouring terms, the balance is stable. If the body is not based on a single point, and on a plane, it will be in a state of stable equilibrium only on condition that the vertical drawn through the centre of mass, held inside the loop formed by the points of support. If this hierarchy is out of this loop, the situation is unstable and the body thrown.

In view of this, if any applied forces do not act on a complete removable prosthesis of the mandible, it is stable, because its centre of mass is inside the parabola that the entire length based on alveolar arch. In that case when forces act outside the body, a measure of its resistance value is moment force that causes rollover. That is essential not only the magnitude of

force and power projection and product direction for the balance of the body, carried to the point of application of force at this point distance from the centre. The torque force of the prosthesis should be less than or equal to the torque force of the prosthesis. Increasing of the mass of the full removable prosthesis to the lower jaw is to some extent possible, but since it accelerates the atrophy of the alveolar process, this factor is not considered. As for the increase of the support area, it is possible to increase the stability of the full prosthesis on the lower jaw by expanding the outer boundary of the prosthesis base under the control of functional samples.

During chewing of the upper jaw on the occlusal surface of the lower jaw are variable in time and the direction of the forces are concentrated in the area of posterior teeth.

In addition, lowering of the lower denture in the side sections to the 1/3 of the occlusal vertical dimension compared to 1/2 for the same area of support allows the prosthesis to be in stable equilibrium by increasing the maximum allowable angle. This enables full lower denture moves to implement a wider amplitude and thus to return to a state of stable equilibrium.

Functional and physiological method of determining the value of the central jaws

The creation of conditions for full functioning of prosthetic is one of the main tasks solved by the experts at the diagnostic stage. The effectiveness of diagnosis ultimately leads to depth of evaluation of the pathological condition, and to the quality of the diagnostic process.

Creation of the conditions for full functioning prosthetic is one of the main tasks solved by the experts at the diagnostic stage. The effectiveness of diagnosis ultimately leads to depth evaluation of the pathological condition put in other words the quality of the diagnostic process.

With the growth of morphological and functional abnormalities in the development of pathological conditions compensatory-adaptive query increases in the system of maxillofacial area, the volume of construction and the amount of remedial measures required to restore lost organs are increased. At the same time during the life of the body's ability to adapt is reduced. Both of these processes refer to the decrease of resource adaptation and rehabilitation opportunities.

Chewing function is controlled, which makes chewing regulation process of feedback. This feedback signal can be registered load the entire dentition. At this point, it displays the status of all its integral elements. This idea is in the underlie of the functional and physiological method of determining the centric relation that due to the volume and nature of errors is crucial in the rehabilitation of patients with complete absence of teeth.

The absolute value of the maximum compression force jaw allows face the optimum distance in case of total loss of teeth. This creates prerequisites for the rehabilitation of reserve capacity of the patient`s dentition.

In fact, functional and physiological method of determining the value of the central jaw is an individual test load that allows us to diagnose the

stage to simulate operating conditions dentition, selecting the most effective mode that provides a restore function of mastication.

Functional and physiological methods other than identifying the maximum effort of compression jaws and fixing interalveolar distance allows us to determine the structural bite in the sagittal and transversal planes. For this purpose, the method of intraoral record trajectories of movement of the mandible is used.

The following data was determined by the method of intraoral mandibular movement recording with using with Centrofix. 11.3% of cases retrusal extreme position of the mandible is also the central point value jaws, i.e. with retrusal extreme positions the lower jaw can perform lateral movements. The nonconvergence of extreme retrusal positions and the central relation were detected in 88.7% of cases. The starting point is the central value is based on 1-2 mm forward or away from extreme retrusal positions of mandible. Ignoring the fact of incongruence of extreme retrusal and central relation leads to errors in the design of artificial limbs and fixing the mandible in a forced position. One of the most important elements determining the structural bite is the fixation position of the lower jaw in the transversal plane. Thus, in 26.8% of cases the discrepancy-starting point fixing jaw was detected in the usual position.

The value of transversal displacement ranges from 1.5 to 3.4 mm. The findings suggest that with age comes the usual stable fixation of lateral displacement of the mandible. Therefore, 88.7% of intraoral registration method trajectories moves lower jaw at the stage allows diagnostics to detect the degree of activity of masticatory muscles and synchronous operation of the temporomandibular joint.

However, the fixing central value a jaw is performed by the wax patterns and it has several drawbacks. First, it requires a special visit to the patient to determine the central value, as templates for making wax models needed; secondly, in making wax patterns spent wax-time technology; thirdly, the wax patterns are often deformed and shifted, guiding to errors in determining the value of the central jaws.

Therefore, a method of fixing the central relation plaster was proposed by I.M Oksman (1931), A.I. Betelman (1943), A.I. Goldman (1950).

Determining of the value of the central jaw was improved by H. I. Sydorenko. Improved method of fixing a central value in patients with complete loss of teeth with was erected. The technique has following peculiarities: get mixed plaster of consistency, for finger impression, place it on the alveolar bone of the lower jaw so that the side sections to fill in the space between the alveolar ridge of the upper and lower jaws, and in the front area between the plaster and the alveolar process of maxilla leave space 57 mm.

Then offer the patient slowly close your mouth while controlling the height of the central value obtained earlier. When during the closing jaws distance between dots on the tip of the nose and chin reaches the height

dimensions of the central relation, asks the patient to hold the jaw in this position.

After complete crystallization of gypsum block you should deduce from the mouth and give it a trapezoid shape. Then the gypsum block was inserted again injected into the mouth and through 2 lines define the prosthetic plane by certain CITO rules, noting their pencil on the vestibular and lateral surfaces was erected. Further, the cosmetic centre line of canines and smile is noted. In the laboratory cast models are made which are composed of the position of central occlusion, they fix into the occludator. The gypsum block is cut in the horizontal plane according to the prosthetic into 2 parts, which are used for setting the teeth for the installation of artificial teeth.

One of the advantages of this technique is the reducing of the number of visits of a patient.

However, the technique by H. I. Sydorenko also has drawbacks: 1) inaccurate determination of the central height relation; 2) inaccurate determination of the neutral position of the lower jaw; 3) a high percentage of errors in spraying was erected on the prosthetic plane.

Therefore, if the doctor is necessary for various reasons to reduce the number of visits of the patient, Goldman offers the following technique: after preparing wax impressions occlusal ridges and stick them on the outer surface of the impressions. Then they are injected into the patient's mouth, defining a central value ordinary method.

It should be noted that for a significant atrophy of alveolar bone in the mandible jaw the central value is determined by solid plastic bases for their better stability.

Determination of the centric relation by lapped pins

In 1929 Efron proposed to define the central value by the wax patterns with simultaneous construction of occlusal curves. After determining the central value at the upper occlusal ridges affirm the special scrapers, which during the horizontal movements of the lower jaw cut wax occlusion of the lower rim. Thus, custom sagittal and transversal occlusal curves are formed. After this operation, the upper and lower wax patterns were fixed in neutral.

In 1937 Gelfand and Katz improved Efron method replacing wax patterns on stens bases with occlusal ridges, because they are best kept in the mouth. The central value was determined and formed determination the height of the occlusal ridges by conventional methods. The next step was to establish the phenomenon of Christensen (sagittal and transversal). The resulting wedge-shaped gap filled with stens that fix to the lower rim. The corresponding wedge was cut from top rim. Then on the occlusal surface of the slurry was imposed pumice or emery and asked the patient to carry out all the possible lateral movement of the mandible for 20-30 minutes.

The appropriate notes were made on rims after lapping and they were recorded in the mouth in a central position value by the wire brackets.

The method of determination of the central relation of the simultaneous construction of custom occlusal curves has been using by the Department of

Prosthetic Dentistry with Implantology UMSA since 1996 year, which was based on the method developed in CITO and Gelfand-Katz.

This method has the following steps:

1. The formation of vestibular occlusal surfaces on the rims (arbitrary for each patient). The construction of prosthetic plane according to Kamper line and the line of pupils;

2. The determination of height relative to physiological rest;

3. The determination of sagittal Christensen phenomenon;

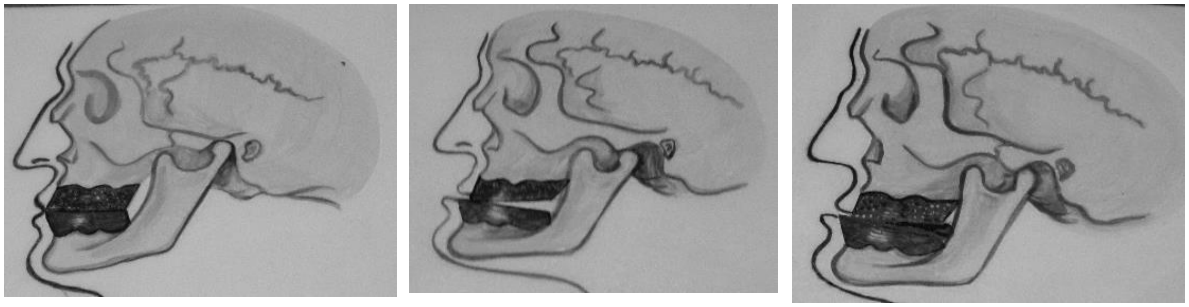
4. Grinding of rims occlusion for 20 minutes. This only lower occlusal ridge (central to the height relation) is erased, because the corundum is administered into the upper occlusal ridges;

5. The fixation of the upper and lower occlusal ridges in the central position value preheated metal brackets;

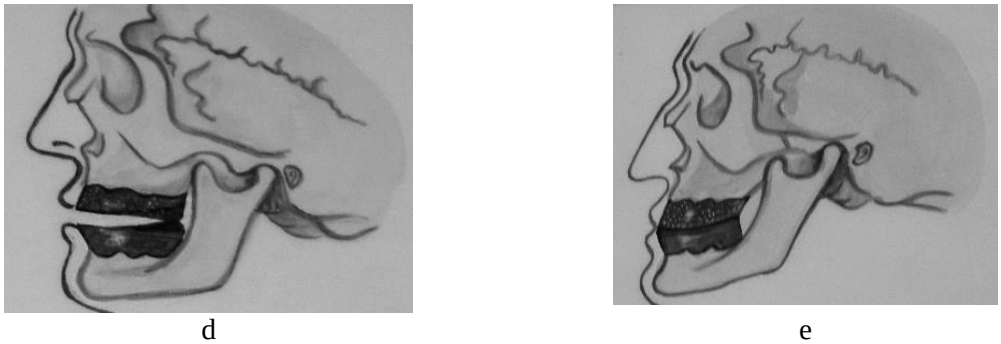
6. Drawing of the upper rim.

After correction of custom samples the occlusal surfaces are formed by Herbst tray arbitrary. The work begins with the upper ridge (the height of the upper platen construction prosthetic plane formation vestibular surface). Then you should determine the height relative physiological rest and central value and begin to work with the lower platen (Fig. 32, a). The lower platen is oriented to cut height relative physiological rest, that is a central value increases to 1,52 mm (This increase is supposed to grinding rims).

The upper and lower occlusal ridges are formed depending on the severity of the phenomenon Christensen. The patient was nominated jaw forward, while between the rims in the side area there is gap wedge shape (Fig. 32, a). To eliminate the gap between the rims injected with soft balls stens that positioned and fill the gap (Fig. 32, b). When you move the front rims of the central occlusion crack appears in the front section (Fig. 32, c). In order to achieve closure rims across the gap from the upper rim in the region of molar excess stens cut in a wedge of suitable size (Fig. 32, d).



a b c



d e

Fig. 32. The method of determining of the central value of the simultaneous construction of custom occlusal curves. The explanation is in the text

Once achieved uniform, dense and simultaneous closing ridges across the surface, mount custom trays tape width Ortokor 4-5 mm. Then the patient begins grind in stens rims performing anterior-posterior and lateral movements 15-20 min., While grind in lower to the upper platen to the height of the central relation. During the grinding rims reached the final formation of the custom occlusal surfaces allowing for the condition of joints and functional asymmetry chewing muscles (Fig. 32, e).

State central value fixed by fixing rims between a preheated metal clips. Draw rims, impressions the upper and lower jaws derive from the oral one unit and transferred to the dental laboratory, where both models are cast and fixed in a state of central value in a simple hinge occludator. Setting the teeth arbitrary carried out considering the existing occlusal curve.

Thus, the correct definition of the central jaws value is a key to setting the correct anatomical teeth. For functional teeth set-up should consider the relation articulation, making them articulators.

Part III

BASICS OF ARTICULATION AND ITS PRACTICAL APPLICATION IN CLINICS OF PROSTHODONTICS IN EDENTULOUS PATIENTS

Highlighting of the biomechanics of the structure dental system improves learning work of masticatory apparatus taken regarded by some chewing phases. During the operation of the masticatory apparatus completely isolated phases there they usually combined. Work masticatory apparatus schematically consists of the following main phases: opening and closing the mouth, moving the lower jaw forward, backward, side and combined movements.

In practice, prosthetic work has two main classes of masticatory apparatus - articulation and occlusion.

The term "articulation" A.Y. Katts defines as all the possible movements of the mandible relative to the upper. This relation highlights the different phases of dentition.

The term "occlusion" determines any correlation closing dentition lower and upper jaws. Occlusion - a special case of articulation.

Study occlusive conditions revealed the presence of functional interaction between the various elements dentition. This pattern is the basis for the structure of the devices that reproduce the movements of the lower jaw, and must take into account in the design of artificial dentition. Devices that reproduce the movements of the mandible in vertical and sagittal directions transversal are called articulators, and those that reproduce only vertical movements – occludator.

There are four main occlusions: central, front and two side (right and left). Here are typical joints, muscles and signs of dental occlusions.

Central occlusion1) joint head located on the slope of the articular tubercle, at its base; 2) chewing muscles are in a state of isotonic stress; 3) there are multiple contacts fissure-hump in lateral areas. The median line is between the central incisors of both jaws. Front upper teeth overlap the lower 1/3 only natural orthognatic bite, and complete dentures value lower teeth overlap the upper of only 1 -2 mm. The upper canine lies between the first lower premolar and canine. The medial hump has first molar buccal contact with the central fissure of the lower first molar.

Front occlusion is formed by nominating the lower jaw forward. Articular head shifted forward and placed on top of articular tubercles. This is due to the simultaneous reduction of the external pterygoid muscle. Cutting edges of the front teeth of the lower jaw are installed in contact with the cutting edges of the front teeth of the upper jaw. The median line also runs between the central incisors. The side sections of the same name, there is cusp contact tubercles (cusps buccal upper teeth in contact with the lower buccal tubercles).

Side occlusion is formed by moving the lower jaw to the sides, left or right. At the side of the occlusion, joint heads have different shifts: on your side, they have a rotational motion around the longitudinal axis, and the balancing - forward movement down the lead in working toward. Unilateral reduction of the lateral and medial pterygoid muscles is shifted in the opposite jaw from the reduction side. Midline between the central incisors is not the same. The side sections on your side there titled cusp contact and on balancing - opposite cusp (buccal tubercles of the lower teeth in contact with the upper palate tubercles) or gap between the upper and lower teeth.

Mandible movements and changes in the relation of elements temporomandibular joint and dentition

It should be noted that in prosthetic dentistry articulation problem is still relevant. There were many theories on which tooth rows constructed in complete dentures. All known theories Vodrich (1958) tried to group. The most common are:

1. Compensational theory;
2. Spherical theory;
3. Theory of custom formation of occlusive curves.

Open your mouth

In lowering the lower jaw are three phases - small, large and maximum. This corresponds to three types of movement's joint heads.

According slight lowering of the lower jaw joints head in the Lower posterior part of the joint rotate around the transverse axis passing through their centre.

By significantly lowering the mandible to hinge joint rotation slip joint heads joined together to drive down and forward on the articular tubercle.

For maximum lowering of the lower jaw sliding head stays on top of the articular tubercle and continue only hinged movement. The amplitude of mouth opening is strictly custom, on average 4-5 cm. Lowering the mandible and under way, realized articular heads - is also highly custom characteristics masticatory apparatus. It all depends on the shape and height of the articular tubercles and left and right cusps are not absolutely identical in shape and size. This distinction further customizes the mandible movements in each custom patient. Thus, by sliding occlusal contacts only need to control the mouth of the patient and not in articulators.

Progress of the lower jaw forward (sagittal compensation curve)

The displacement of the lower jaw forward is possible within 515 mm during chewing function – 2-3 mm. During forward movement of the lower jaw joint head moving forward and downward. The path traversed articular heads, called the sagittal articular infections (Fig. 33).

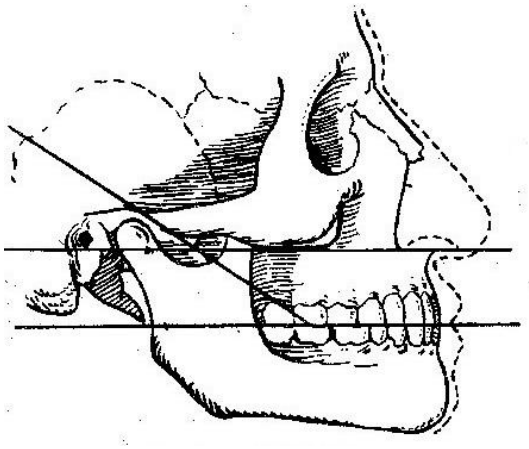


Fig. 33. Sagittal articular path

The angle of the sagittal joint path relative occlusal plane custom and varies from 5° to 70° (average – 33° per Gyzi).

It should be noted that the prosthetic plane and occlusal plane - not identical concepts. V.E. Suzdal (1988) showed that the occlusal plane, which passes through the cutting edge of the lower central incisor and distal-buccal protuberance of the lower second molar without parallel Kamper plane. Prosthetic same plane held on the cutting edge of the central upper incisor and discontinuous hump teeth of the upper jaw parallel Kamper plane. It deviates from its bottom in the distal 2 +/- 0.14. According to Hofmann M. (1979), this deviation is 3.870.

Promotion of the lower jaw forward is performed during orthognatic incisive bite of a possible overlap if mandibular incisors come to overlap.

However, they are cutting their margins to slip down the surface of the palatine maxillary incisors. Slide continues to shrink the cutting edges of the lower jaw edges maxillary incisors. The path travelled by mandibular incisors is called the sagittal incised path (Fig. 34).

The angle incisive slide relative occlusal plane is custom and varies from 40° to 50°.

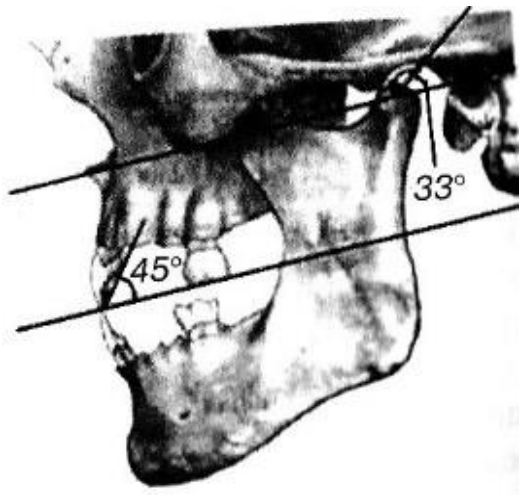


Fig. 34. Sagittal incised path

Moving forward, mandible posterior falls under the slope of the articular tubercle and forward - on the value incisive overlap, while there is a gap between chewing teeth. According to different authors, in 52 – 56% of patients with lateral teeth in contact, and 48 – 46% of such contact is not available. When the value of deep bite slit in the side sections depends on the height of the articular tubercle. For direct contact is maintained bite and lateral areas.

However, often there three-point contact (Fig. 35), which was firstly described by Bonviller: one contact point in the frontal area, and two - on the last molar distal tubercle.

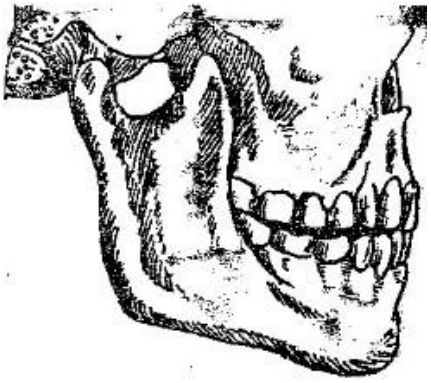


Fig. 35. Three-point contact Bonvill

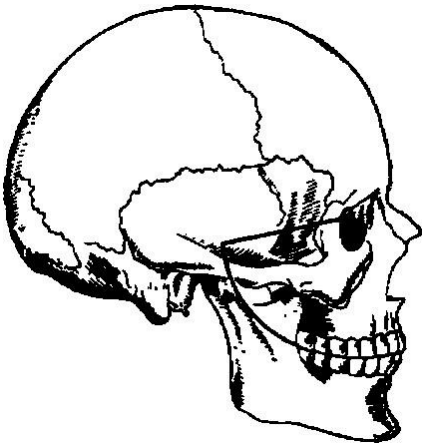


Fig. 36. Sagittal occlusal curve (Spee)

This contributes to sagittal occlusal curve - the curve of Spee (Fig. 36).

In the natural bite presence, three-point contact is not as important as for full dentures. Having occlusion contact between the side teeth when moving the lower jaw forward trapping complete prosthetic dentures to areas and keep them from tipping over. For this reason, sagittal occlusal curve by Gyzi, Kantorovich, Schroeder and other authors call compensation. In the absence of contact between the teeth while chewing sagittal displacement of the mandible authors called pathological bite. While A.K. Nederhyn, V.A. Ustymenko, A.V. Kolosova denies previous authors. According A.V. Kolosova, three-point contact found only in 54.4% of people with orthognatic bite. However, the design of dentition in full dentures is sure to create

multiple or even three-point contact between artificial teeth in the lower jaw shifts forward. Such an artificial tooth promotes good stabilizing dentures during chewing.

Lateral displacement of the mandible

Side occlusion is divided into right and left. It is formed with the movements of the lower jaw to the sides - right or left.

On the side muscles shrink, joint head moves down, forward and inward, making a reciprocating motion. On your side of the articular head raised slightly up and back, thus carrying only pivot arm. The medial and upper walls of the articular fossa, the slope of the articular tubercle, determine this path. Articular head on the balancing side, ie the side muscle contraction, makes way down, forward and inward, forming an angle of 15° - 17°. This angle side (transversal) joint path or Bennett`s angle (Fig. 37).

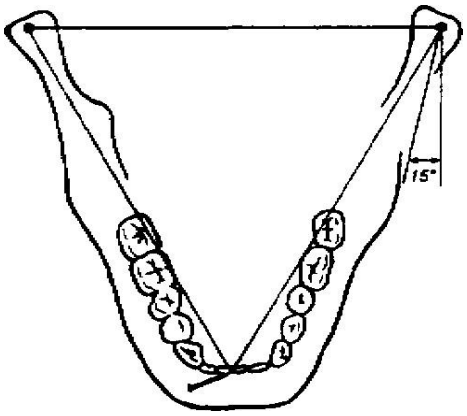


Fig. 37. Angle joint transversal path (Bennett`s angle)

When moving the mandible to the left or right incisive point describes curves that intersect at an obtuse angle. This angle side (transversal) incisive way or gothic angle (Fig. 38). It defines the scope lateral incisors and movements of 100° – 110°.

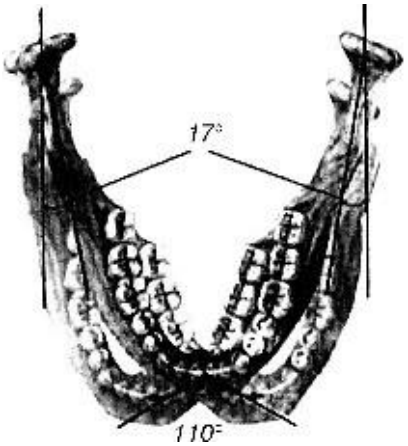


Fig. 38. Angles transversal articulate and incisive ways (Gothic corner)

Due to different levels of location cusps posterior teeth are formed side occlusal curves that pass through the cheek and tongue cusps both sides of the posterior teeth (Fig. 39).

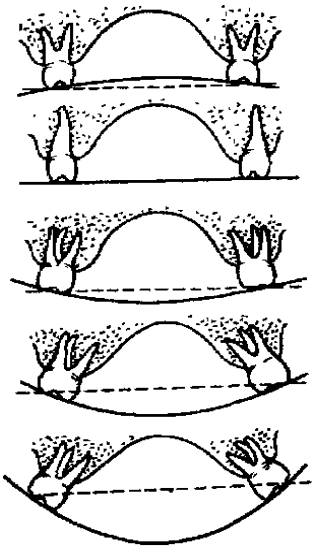


Fig. 39. Transversal occlusal curves (curves Wilson)

Lateral occlusal curves provide storage occlusion contact in the area of posterior teeth with lateral displacement (on the balancing side).

Chewing teeth of the lower jaw are faced with their antagonists oppositely tubercles on the opposite side (working) – the same name (buccal top of the lower cheek, upper palate of palatal lower).

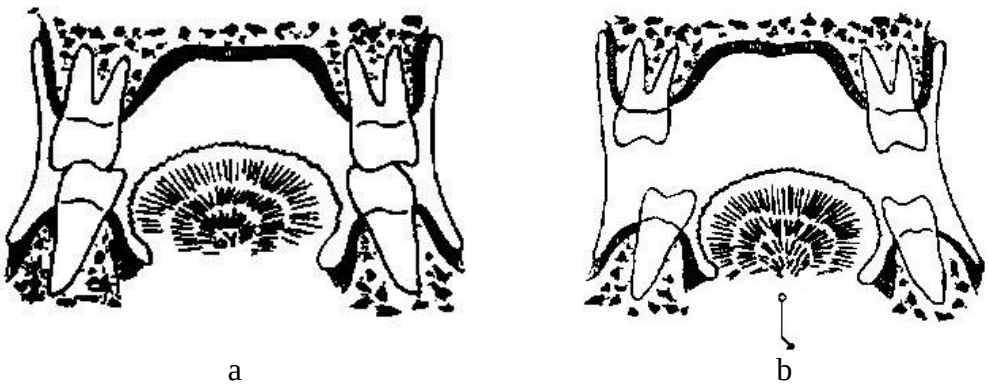
Gyzi defines circular lateral movements, i.e. movements that start from the position of central occlusion and again he returned. According Gyzi, this cycle consists of four phases (Fig. 40):

Phase 1 – lowering the mandible (a);

Phase 2 – shift working direction (b);

Phase 3 – the closing of the same name to the contact cusps (c);

Phase 4 – sliding back into central occlusal position (d). According to A.J. Katz, each side movement should be considered twoshifts: the first – with a side of central occlusion; second – the return to the original position.



a b

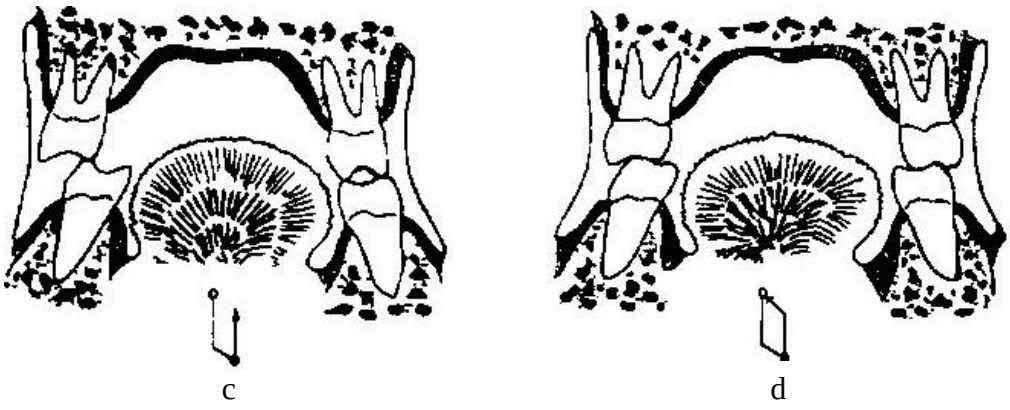


Fig. 40. The complex posterior mandible movements (in Gyzi). The explanation in the text

Note that on your side is intercuspedation same name tubercles, otherwise would occur grinding food. As for the balancing side, there is a possible formation of oppositely contact cusps and the absence of any contact. The last statement supported by research A.J. Katz, A.K. Nederhyna

Constructing tooth rows in complete dentures create contact between the teeth as a side shift at work and on the balancing side that will promote good stabilizing dentures during chewing of food.

Bonvill based study of the relation between sagittal articular and incisive character and ways of compensating mechanism dental occlusion put the laws that form the basis for constructing anatomical articulators. The most important laws are:

1. Distance joint heads between centres and between them and medial angles of the lower central incisors form an equilateral triangle (triangle Bonviller), each side is equal 10 cm (Fig. 41);

2. Character of posterior teeth cusps is in direct proportion to the frontal overlap: when it is larger, the chewing cusps are more pronounced;

3. Line of closing the lateral teeth is bent in the sagittal direction;

4. Vestibular surfaces of front teeth are arranged in a circle and the side – in a straight line;

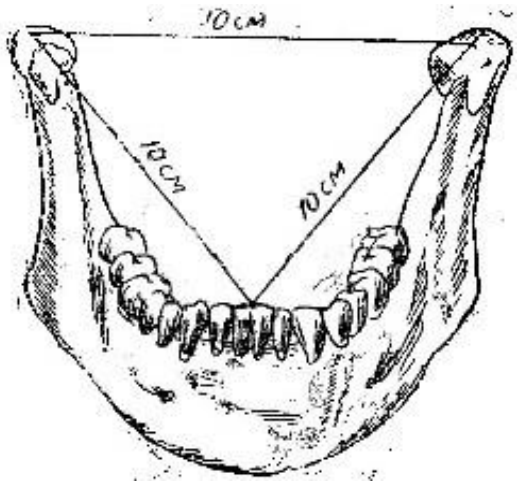
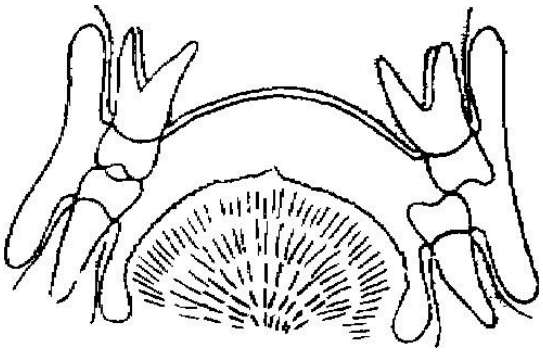


Fig. 41. Bonvill Triangle

5. The closing of tubercles with the same name is carried out during lower jaw movements to the side and the different ones is carried out on the balancing (Fig. 42).



a b

Fig. 42. Value of lateral displacement of teeth in the lower jaw left: a – balancing side; b – working side

Hanau expanded and deepened this relation. When setting artificial teeth prosthesis Hanau proposed to consider the following:

1. The slope of the articular path;
2. The depth of the compensation curve;
3. The slope of the approximate plane;
4. The slope of the upper incisors;
5. The height of the cusps posterior teeth.

The complex is called quintuple articulation by Hanau in the literature. The keynote of it is the sagittal articular steeper path; the more pronounced should sagittal compensation curve. The more frontal overlap, the higher must be cusps posterior teeth. If the angle of the sagittal joint path - 33° overlap in the frontal area should be1 mm (In full dentures) or 1/3 of the height at orthognatic incisors bite.

However, Hanau did not consider lateral occlusal movements. According to B.R. Vanshtein (1943), the following elements of articulation should be considered in setting artificial teeth:

1. The angle of the sagittal joint path;
2. The angle of the sagittal incised path;
3. Angle joint transversal way;
4. Angle transversal incisive way;
5. The angle of cusps;
6. The angle of the occlusal curves;
7. The direction of the occlusal plane.

A.D. Schwartz (2002) offers observe the following rules to achieve balanced occlusion in the manufacture of removable and fixed structures:

1. Value major (reference) and non-conductive (nonworking) tubercles of teeth in cross-section should be 5:3;

2. The angles of inclination of slopes anatomical occlusal surface relative to the horizontal plane in fixed dentures should be: guiding – 30° non-guiding – 15° (in full denture – 25° and 15°);

3. Central slope must be in the middle of the occlusal surface;

4. The distance between the tops of the guiding and non-guiding cusps must be equal to half the size of the tooth cross;

5. The angle of slope in the sagittal direction is 25° – 30°.

In the literature, these provisions are known as quintuple occlusal by Schwarz.

In the design of dentition the elements of articulation difficulties of registration and errors in the determination of the angles are given. In addition, recording elements and their articulation artificial copy require complex and expensive equipment.

Use of articulators' averages in the construction of artificial dentition, according to A. Ya Katts leads to errors in either direction at 20° – 25°. In addition, articulators minded average parameters not taken into account the asymmetry of temporomandibular joint.

All these shortcomings to some extent eliminate custom methods of forming occlusal surfaces in the mouth of the patient, which are developed by H.A. Efron, A.Ya. Katts, Z.P. Helfand, H.V. Shylova, I.T. Miroshnychenko, A.L. Sapozhnikov, L.F. Bosa.

The technique of forming custom occlusal curves is to prepare the wax-abrasive (G.A. Efron, A.L. Sapozhnikov) or stens-abrasive (A.J. Katz, Z.P. Gelfand, I.T. Miroshnychenko, H.V. Shylova, L.F. Bosa) templates from forming on them sagittal and transversal curves based Christensen phenomenon.

G. Monson (1920) proposed a spherical theory, which was based on the provisions E. Spee (1890) and S. Wilson (1918) of the sagittal and transversal curvature of the dentition. According to G. Monson, buccal tubercles of teeth located within a spherical surface and the line drawn through chewing cusps on their long axis directed upwards and converge at a common centre Crista gallae human skull (Fig. 43).

Fig.43. The curvature of the dentition according to G. Monson

The radius of the spherical surface is 10.4 cm. Based on this; the author has designed its articulator.

The theoretical justification for the principle of the spherical structure of human dentition of physical and mathematical positions is given by B.T. Chernyh, S.Y. Hmelevskyi (1965). They believed that the radius of each spherical surface corresponds to a certain angle joint path. For example, the radius of the spherical surface has 18 cm articular responsible way in 28º. They developed custom scope for setting artificial teeth.

R Fisher (1956) recommended for the general type of person to use a flat field for setting the teeth for a narrow is curved. How is O. Hoffer, E Reichlenbach (1969) pointing in the mass fabrication of patients sufficient to use metal plates with an average radius1 2.5 cm.

M.A. Napadova and A.L. Sapozhnikov (1972) recommend the use of plates with an average radius sphere 9 cm which is known anatomic staging matches on glass teeth.

Devices that reproduce the movements of the mandible

Devices that reproduce only the opening and closing jaws are called occludogramm. Devices that reproduce the movements of the lower jaw, opening and closing the mouth and jaw shift back and forth, left and right - articulators.

It is well known that the manufacture technician occludator structures in most of the necessary correction of occlusal contacts on the finished work. This significantly reduces the value of functional dentures. Occludator only applies to retention models, and not a device for setting artificial teeth or chewing surfaces modelling. He does not play forward and lateral movements of the mandible. Nevertheless, the problem lies in the fact that occludator not provide proper closure of the alignments even in the central occlusion. Typically, the closing of dentition in central occlusion appears that some parts of the occlusal surface side artificial teeth close up earlier than the rest of the teeth. This is because ways that closing jaws in central occlusion in a patient occludator and divergent because of the difference in the location of the hinge axis and incisive range of movement of the mandible. Of all the movements of the lower jaw it reproduces only opening and closing.

Occludator has two wire or cast frame, lower frame at an angle of 100° – 110° and a flat top; screw or pin height for fixing the height of the central occlusion (Fig. 44).

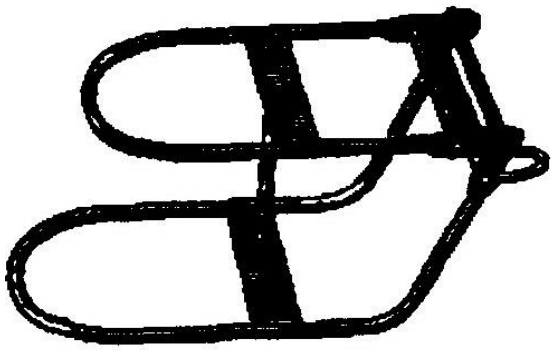


Fig. 44. Wire occludator

Both frames are connected hinge. In the dentures manufactured in occludator not form displayed occlusal surfaces of the teeth and dental arches that does not meet the custom structure of masticatory apparatus.

Gypsum model occludator performs without guidance. Custom features of dentition in creating dentures while imposing them on the jaw, checking and clarifying their relation in all occlusion using imaging (articulation) of paper during movement of the mandible.

Further development of the theory of designing devices that reproduce mandibular movement associated with articulation problems developing in general.

It was established not only the versatility of movement of the lower jaw, but also that they have custom characteristics. V.Yu. Kurliandskyi all devices that reproduce the movements of the mandible, distributed into three groups:

1) Articulators universal:
   a) arcon;
   b) non-arcon;
2) Average articulators;
3) Occludator:
   a) simple;
   b) improved.

The first primitive gypsum articulator was created in 1805 by the Parisian dentist Gary. In 1840 Evans received a patent for articulator who performed the protrusive and lateral movements of the mandible (Fig. 45).

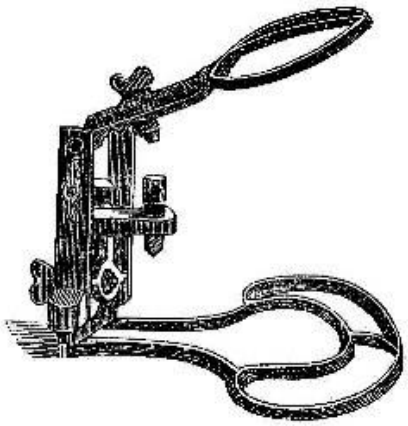


Fig. 45. Articulator of moving lower platform by Evans

First anatomic articulator was constructed by Bonvill; he was a founder of articulation problems (Fig. 46).

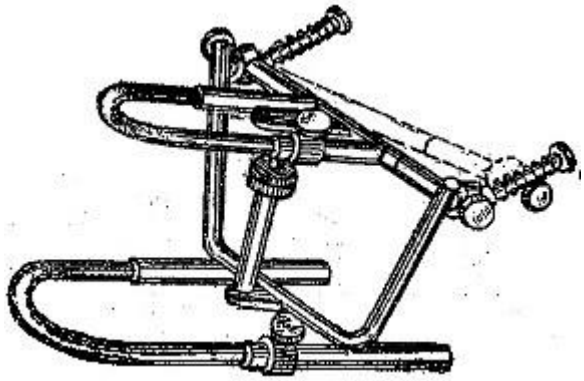


Fig. 46. Bonneville Articiculator

Exploring skulls Bonneville found that the average distance between the heads of the lower jaw and incisive point is 10 cm. Connection of these points get Bonvill triangle. It is a key element of building many anatomical articulators, because it cannot identify the spatial position of models in articulators. But the downside was articulators Bonneville horizontal arrangement of articular routes.

The basis of anatomical structures articulators with average inclination joint installation paths laid arithmetic data determination the size of the joint angles and incisive ways. For sagittal joint path, this angle is 33°, for lateral is 17°, for lateral incisive is 120°. Devices constructed on the basis of these data, called articulators with average (standard) setting joint path. In a similar articulator designed Sorokin (Fig.47). With devices of this type was the most common articulator by Gyzi "Simplex N" (Fig.48).

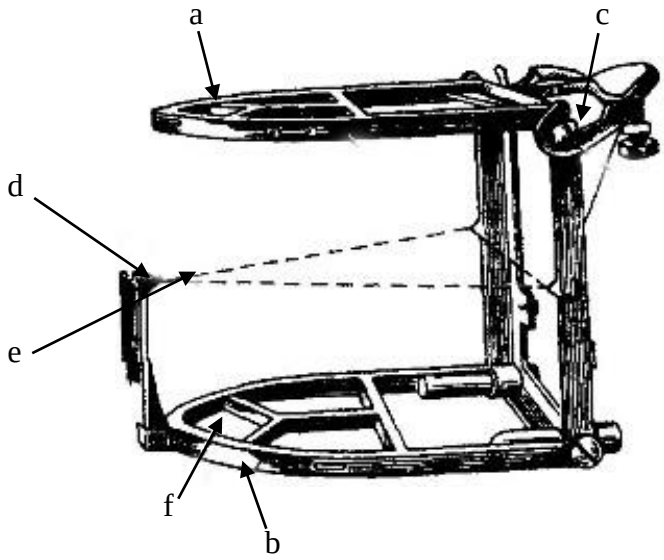


Fig. 47. Articulator by Sorokin:
a – upper frame; b – lower frame; c – articular joints, d – pointer median line; e – location occlusal plane; f – grille models fixed

This articulator allows you to play all the movements of the mandible (forward, backward, right and left). The upper frame is moved. The slope of

the articular path relative occlusal plane is 30°, the lateral articular is 17°, sagittal incisal is 40° and lateral incisive is 120°. A reference model for offset lower space articulators serve three terms: a pointer median line and two vertical tabs on the bottom of the frame.

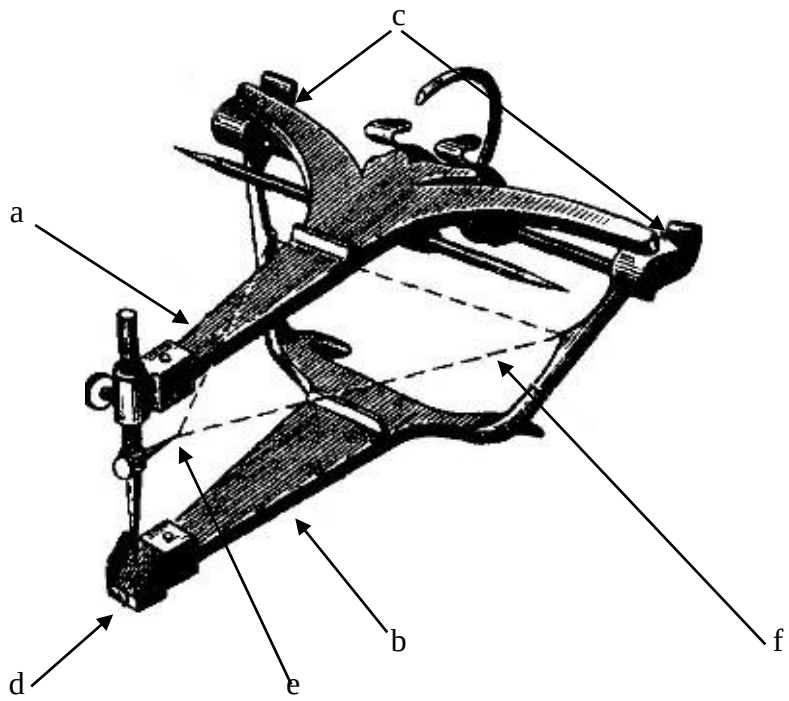


Fig. 48. "Simplex N" articulator is made by Gyzi:
a – upper frame, lower frame b – articular joints, c – mobile incisive playground, d – pointer midline, e – location occlusal plane

The device can play all the movements of the mandible. The upper frame of articulators has three pillars. Two of them are in the articular joints, the third - the incisive site. With vertical pin height face can be fixed, but with the tip of a horizontal pin fixed midline and incisive point is the point between the medial angles of the lower central incisors.

Contrary average anatomical articulators allow universal angles set incisive and articulate ways to slip under the custom data obtained in the examination of the patient. These devices are articulators by Gyzi-Trubait, Chait, Ghanau (Fig. 49) and others. In addition to these articulators, modifications which include blocks, recreating the joint, there are non-arconarticulators.

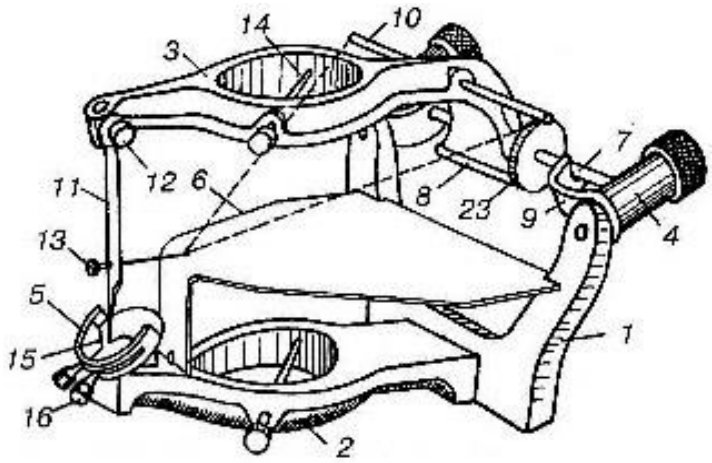


Fig. 49. Custom articulatorby by Hayt:
1 – stubborn tray; 2 – lower frame; 3 – upper frame; 4 – articular mechanisms; 5 – incisive platform; 6 – occlusal pad; 7 – cross rim; 8 – retainer; 9 – L-shaped stops; 10 – control rod bends; 11 – pin vertical; 12 – clamp screw; 13 – horizontal pin; 14 – rods, which are fixed; 15 – rotary sectors; 16 – clamp screws; 17 – cylindrical body; 18 – rim slots; 19 – liner; 20 – spiral spring; 21 – housing cover; 22 – retainer; 23 – knob rotation

Universal joint articulators, as much as anything else devices of this type have the upper and lower frames. The upper frame has three pillars: two joints and one incisive on site. Joints articulators built the type of temporomandibular joint. Linking together the upper and lower frame of the device, they are designed for the ability to play different custom movements of the lower jaw, typical patient. The distance between the joints and articulators pointer median line is10 cm; it also adheres to the principle of an equilateral triangle Bonviller. Universal joints articulator configured so that allows you to set any angle articulate and incisive ways.

However, before you set the angle, you must obtain the original data (the angle of the sagittal and lateral articular routes and sagittal and lateral incisive ways) by special intraoral or extraoral records.

Contrary universal joint non-arcon articulators (Fig. 50) are not the same shape and jaw joints consist of a lower frame (1) fixed on it with 4 cups (2) and the upper frame horseshoe shape (3) with 4 legs ending with metal pins. To horseshoe fixed frame hinged metal plate to fix it on the model of the upper jaw of the patient.

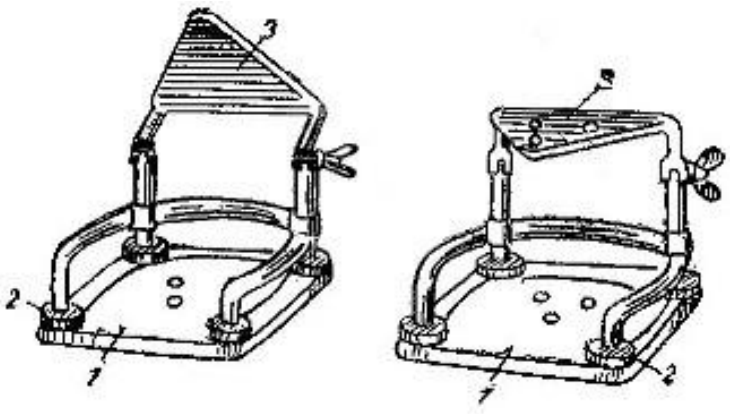


Fig. 50. Articulators universal non-arcon

However, the classification of devices that reproduce the movements of the lower jaw is not perfect by V.Y. Kurliandskyi.

Therefore, according to V.A. Hvatova (2002), V.P. Nespriadko, Z.N. Zhuhulovych (2004), it is appropriate to divide the current articulators into two main types depending on configurelation possibilities of joint and incisive ways (Type I) and the structural features of the joint mechanism (type II). Before I type are average, semi-adjustable and fully adjustable articulators; -arc to type II (Arcon) and without arc (Non-Arcon).

As noted, average articulator has fixed joints and cutter corners and can be used for prosthetic patients with complete loss of teeth in both jaws.

Semi-adjustable articulators have joint mechanisms play and incisive ways that you can customize as per data medium and for custom viewing, these pathways identified in the patient (wax rims, fixing the lateral and anterior occlusion).

The pantographic records of the mandibular movements are required (Fig. 51) to adjust the fully adjustable articulators («Gnatomat» articulator by M.J. Stuart, etc.).

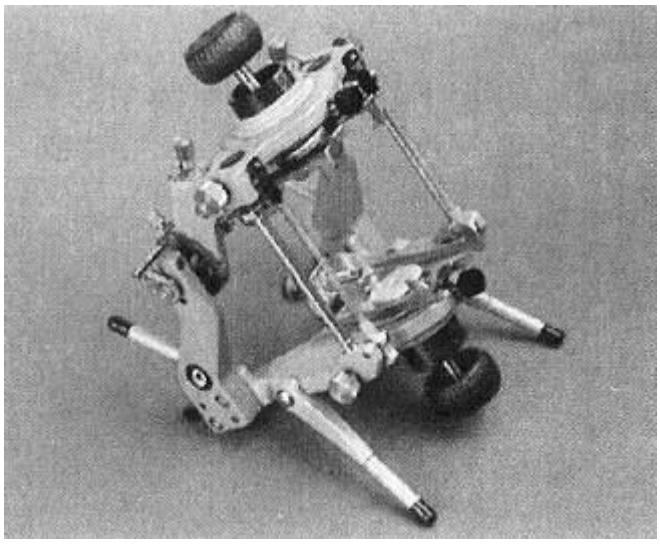
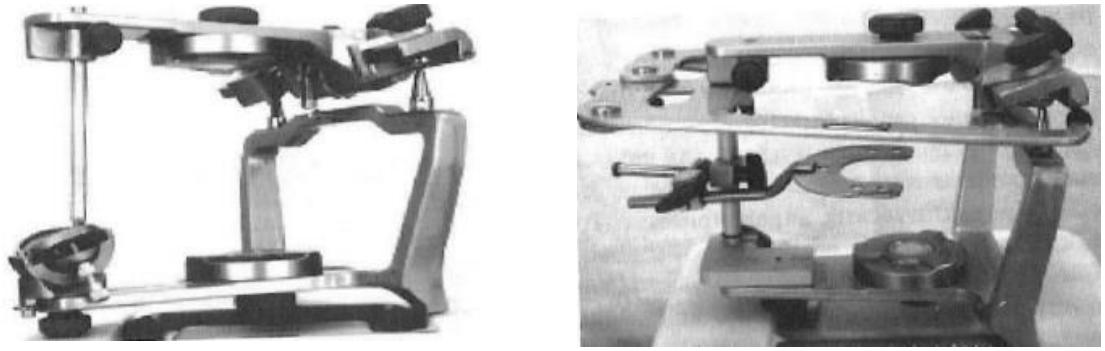


Fig. 51. «Gnatomat» articulator is made by «Ivoclar» company (general view)

Pantograph is a device such as facial arcs, which provides a graphic representation of the way the broad movements of the mandible. Pantograph records used to regulate airflow guide articulators and to study the nature of the movements of the mandible.

Articular mechanism of semi-adjustable articulators can be divided into two types. The first type is used in arc articulator's universal "Arcon" type.



a b

Fig. 52. «Bio-Art» articulation system:
a – without facial arc; b – face of the arc

It consists of moving balls that mimics the articular head and it is on the lower frame articulators. Articular fossa along with move ball is at the top of the joint mechanism.

There are such "Arcon" articulators as "SAM", "Whil-Mix", "Artex" (AS, AT), "Bio-Art" (Fig. 52), "Denar Mark" II, IV, "Dentatus ARA", "Hanan 158"; "Protar" I, II (Fig. 53), "Stratos200" (Fig. 54). Articular fossa articulators some straight, others curved according to the natural slope of the articular tubercle.

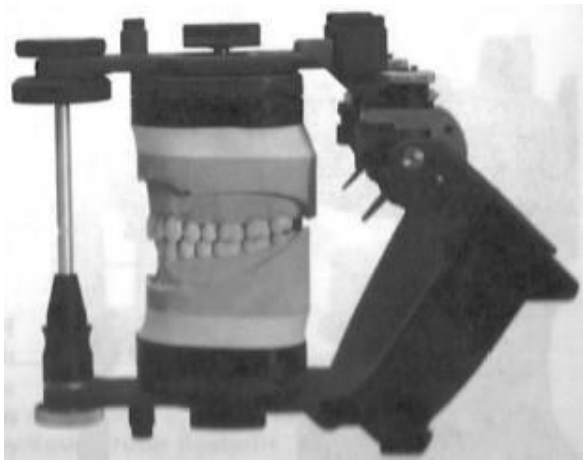


Fig. 53. «Protar» articulator is made by «KaVo» company

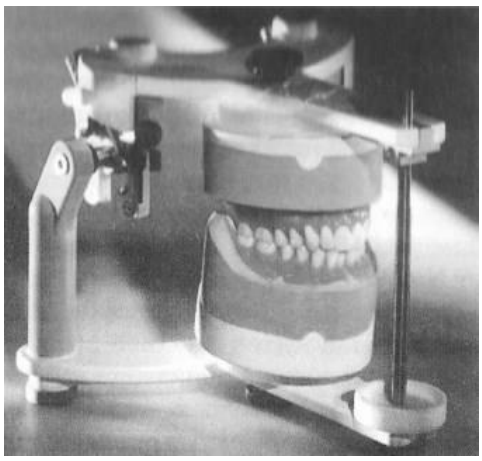


Fig. 54. «Stratos-200» articulator is made by «Ivoclar» company

"Arcon" articulators are freely movable axis movements and mandibular occlusal surfaces of teeth directed. Such articulators versatile can be used to study occlusions of both natural and artificial teeth.

Other joints such mechanism should articulator "Non-Arcon" non-arc. It tracks for moving the balls located at the bottom, and the ball - at the top of the device.

In articulator's type of "Non-Arcon" ball that mimics the articular head, moves in a strictly defined space (gauge) ("Dentatus ARD", "Artex AS", "AT").

In addition to joint mechanism, articulators are incisive stand to play incisive way, which rests incisive rod that holds the vertical distance between the frames. Stand matrix is used as the front and lateral movement of the mandible in restoring anterior teeth

Thus, in the arrangement provided for articulators rear limit component movement of the mandible (articular mechanism), and front-limiting component (rod and incisive stand).

Setting of jaw models in the articulator

Set of the lower jaw in the space between frames of articulators is performed in two ways: 1) using special devices (balance); 2) using facial arc (Fig. 55). In the first case the lower jaw model is originally installed in the articulator, and the second one is a model of the upper jaw.

The balance is a similar occlusal pad that has a water ledge point between the lower central incisors and two planes (wings), the bottom surface is set symmetrically right and left in contact with the distal tubercles of the lower second molars. In the absence of lateral teeth distal edges rocker oriented to middle mandibular cusps.

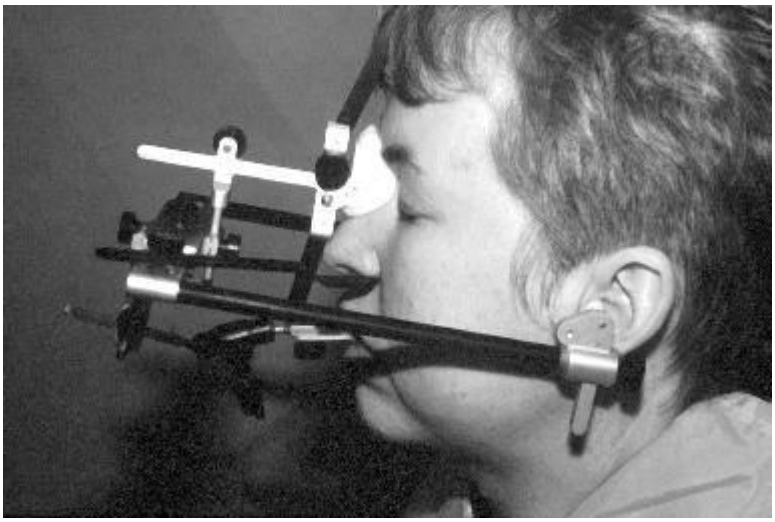


Fig. 55. Facial arc on the face of the patient

The front curve allows placing models in space articulators in such cases, when to do it with rocker impossible. With facial maxillary arch model is oriented relative to joint mechanism (hinge axis) in three mutually perpendicular planes; according to how the patient's upper jaw is relatively

hinge axis joint heads, bite fork transferred to the articulator (Fig. 56). This is essential in order to movements in articulators answered movements of the lower jaw of the patient.

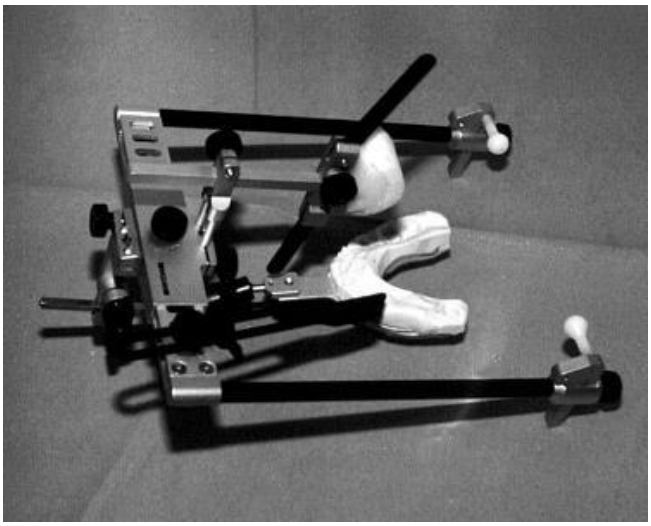


Fig. 56. Bite fork transferred to the articulator

Facial arc is focused on mid-sagittal and occlusal plane (horizontal or Frankfurt). The main part of the facial curves are: lateral arm; bite fork that using thermoplastic mass attached to the teeth of the upper jaw; nasal emphasis; Arrow orbit; mouse middle plane of the skull.

Models in the articulator using the facial arc are installed in such case: at first it is necessary to strengthen bite fork on the teeth of the upper jaw wax or other thermoplastic mass. Then establish lateral levers injected ear pelotte in the external ear canal. The side arm connects with bite fork transitional device. Bow focus trapping facial arc in position. Further, provisions bite fork with teeth Impressions to transfer to articulator. For this, bite fork with a transitional device clear of facial arc and set in the articulator: bite fork located between the frames articulators. In bite fork teeth impressions establish a model of the upper jaw. Fix it to the upper frame articulators. Then the model of the upper jaw bite blocks is fixed to the lower jaw model.

Setting function of custom articulators

Incisors joints and corners articulators can be set according to the average. Specifically settings can be made bite rolls that capture the relative position of the jaws in lateral and anterior occlusion. Easier terms of V.A. Hvatova rims set based on the lower jaw or older dentures. The patient sets the lower jaw in lateral occlusion and almost bites rims, so that they were only impressions cusps upper teeth. On the side offset (balancing) mandible produces impressions of buccal and palatal tubercles, and on the other are palatal tubercles. Alternately setting rims, fixing this or that side occlusion, articular mechanism set up on the side opposite shift (Bennett and sagittal angles articulate way).

Customize articulator cannot bite blocks, directing the movements of the mandible for functional planes (slip teeth). Establish models in occlusion

side and the other side fixed joint angles articulators. More precisely adjust the articulator by using tools that record the movements of the mandible in three dimensions.

Given the shortcomings of modern articulation of E. Brahyn, A.A. Dolhalev (1999) developed a unique articulator (Fig. 57) and the method of settings and determination of the position toothless models jaws of intraframe space.

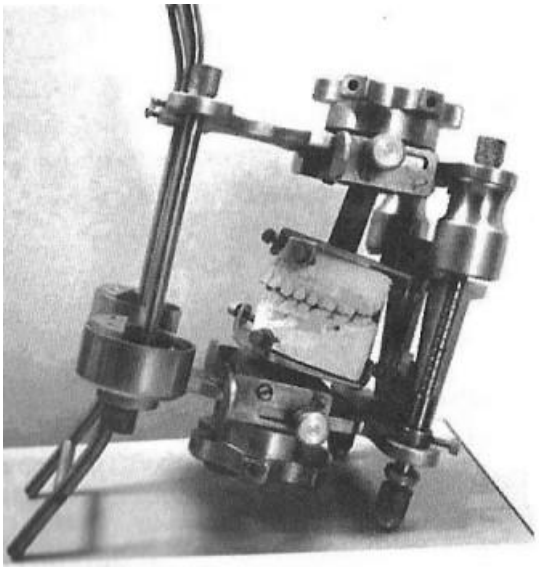


Fig. 57. Custom articulator jaw (AISCH)

The principle of operation is based on him stereographic copying elements of joint movements and lower intraincisial points and playing them articulate and incisive elements articulators, filled with self-curing plastic. For surfaces, formed movements in the joint capsules and incisive articulators on plaster models toothless jaws reproduce the custom movements of the lower jaw relative to the upper. For custom settings selected the best articulators (intraoral) method of recording the movements of the lower jaw relative to the upper.

Thus, knowledge of the laws of articulation, application for setting artificial teeth today articulators permits a functional setting.

Fixation and stabilization of complete dentures.

The full operation of complete dentures is in direct proportion to their fixation stability in the jaws resting during chewing and speaking, as well as uniform transmission chewing pressure on the underlying tissues. According to clinical experience, the stable prosthesis in the jaw, the faster a patient gets used to it, the higher the chewing efficiency of dentures made. Therefore, the problem of fixation and stabilization of complete dentures is a great practical interest.

The term "fixation" means strengthening the prosthesis to the jaw at rest F using auxiliary movements (i.e., suction). Of all the variety of classifications of methods of fixing full dentures, the most noteworthy

classification is by B.K. Boianov. All known methods of fixing it distributed mechanical, biomechanical, physical, biophysical.

Mechanical methods. These include gold plate springs Fauchard, which later was replaced by spiral. Nevertheless, a number of deficiencies, including the constant tension of the muscles that lift the lower jaw, frequent injuries buccal mucosa and complexity hygiene care forced to abandon them.

Mechanical fixation methods should also include the increase in mass of the prosthesis in the lower jaw. This was achieved by introducing into the plastic base metals with a high specific gravity, such as tungsten or tin. Known methods also increase the weight of the prosthesis by making sidepiece teeth. But long-term use removable full prosthesis in the lower jaw with increased weight leads to accelerated atrophy of the alveolar process not only, but also the body of the mandible.

One of the most effective and advanced methods of mechanical fixation today is to secure dentures to a toothless jaw using submucous, and endoossal subperiosteal implants. In this case, the prosthesis fixation element can be used telescopic crowns or girder system.

Biomechanical fixation methods involve mechanical securing full dentures with anatomical structures that are in form and arrangement can prevent displacement of the prosthesis. This is so-called anatomic retention. Yes, well preserved alveolar ridge, hills of the upper jaw, deep palate, prevent horizontal displacements of the prosthesis. The lower jaw retention provides good anatomical well preserved alveolar bone, large symmetrical exostoses round, pear shaped and hypoglossal retroalveolar space. Biomechanical fixing clasps provide ash (processes bases located near transitional fold) in the form vestibular slope overhanging upper jaw, as well as significantly pronounced maxillary hills. To fix the prosthesis in the mandible Kemeni proposed pelotte, which, unlike the ash clapper connected to the base of the prosthesis elastic wire chamber that has resilient properties. Pelotte located in retroalveolar space. If there is space in the pear-shaped and thick mucus tubercle fixed denture base it overlaps. In order to attract sublingual space in the prosthesis fixation on the edge sublingual form rims, and the surface of the denture bases facing the tongue, creating a dent. This relief prosthesis contributes to its maintenance. Tongue in space on the edge of the prosthesis fixation sublingual form rims, and the surface of the denture bases facing the tongue, creating a dent. This relief prosthesis contributes to its maintenance. Tongue in space on the edge of the prosthesis fixation sublingual form rims, and the surface of the denture bases facing the tongue, creating a dent. This relief prosthesis contributes to its maintenance.

Physical methods. There is an underlying physical phenomenon such as capillarity. Capillaries in this case is the space between two congruent surfaces, which are the inner surface of the denture base and the mucosa foundation area wetted with a thin layer of fluid (saliva and selected material from the mucous glands, which together make up the oral fluid). Oral fluid refers to liquids that wet the solid surface. This means that the force of attraction between the liquid and the solid wall surface (denture base) prevail

over the forces of attraction between the molecules into the liquid. Curved concave meniscus is formed. This force of attraction of the liquid to the walls of the prosthesis just maximum margins in the area of the prosthesis and lowest is in the meniscus.

Between the two congruent surfaces of the forces of intermolecular attraction - a phenomenon is called **adhesion**.

Cohesion is sticking, gluing by adhesive liquid (adhesive). Clay is the secret of the mucous glands - mucous that is secreted by microscopic mucous glands, which are in fact the mucous layer. Thus, capillarity, adhesion and cohesion work together, helping to fix dentures.

Fixation of dentures based on the difference in pressure refers to the old ways of strengthening dentures. To this end, the base of the prosthesis to the palate creating a limited cell surface or special rubber camera Raue. Eventually sucking cameras were made celled. Since the use of various devices sucking guiding to hypertrophy of the mucosa, pressure ulcers and mouth breakthrough, their use declined.

Biophysical methods fixing application is a combination of physical laws and margins anatomical features foundation area. A thin space is created when the entire inner surface of the prosthesis. Moving mucosa in contact with the edge of the prosthesis prevents the penetration of air under the denture base to form a locking valve. Regional locking valve occurs only if the impression slight edge implants mucosa in the area of transitional fold. Since the fornix mucosa has a significant compliance and little mobility, then the time shift from his areas denture during chewing, it goes on the edge of the prosthesis and edge locking valve is not destroyed. If the prosthesis moves its edge can move, but kept his contact with mucous membranes. Therefore, in closing the valve formation may participate mucosa, located fornix lower jaw and therefore below it in the upper jaw. Lots mucosa involved in the creation of regional closing valve called a zone. Vacuum under the prosthesis appears only during the function, so this method of fixation of the prosthesis often called functional Suction.

Stabilization is a stability of the prosthesis with functional movements of the mandible (chewing and speaking). Stabilization depends on:

1) correctly chosen design of the prosthesis (or is it prosthesis with a metal base or without a palate prosthesis, dentures made of gum Klammer, or pelotte by Kemeni);

2) all the factors of fixation (but they are essential for stabilization as possible a good fixation of the prosthesis, but poor stabilization) and compliance with the margins of the prosthesis foundation area;

3) proper definition of central occlusion;

4) properly carried out anatomical setting of artificial teeth of prosthesis;

5) dense and uniform fitting denture base to mucosal foundation area, taking into account the degree of compliance.

Properly selected margins denture prosthesis is the key to success.

As mentioned above, the limit of full dentures should end with the neutral zone, avoiding moving bands mucosa (frenulum of the upper and lower lips, tongue and buccal bands). However, it should be noted that the choice of prosthesis margins affect the degree of atrophy of the alveolar ridge. If the patient meets the maxillary atrophy of 1st type by Schroeder and bottom is 2nd type by Keller, borders dentures may terminate the neutral zone. Functional Impression called out with proper functional. Dentures that were made by such reflections and under favourable clinical conditions in the mouth will function well. In addition, with greater atrophy of the jaws to create a strong locking valve prosthesis border is formed by moving the mucosa. The limit should cover the neutral zone and go to movable mucosa by 1-2 mm.

Prosthetic flange on the upper jaw. When bypassing the upper lip frenulum, prosthetic flange passes through the neutral zone toward the buccal frenum. The prosthetic flange goes through the mucobuccal fold, behind upper jaw cusps and on to the subpalatal surface while unloading buccal frenum. Here the denture flange passes through the vibrating line which separates hard and soft palate. Palatine fossa is used as a reference point for identifying the location of the vibrating line. Location of the latter may vary depending on the location of palatal arch. The prosthetic flange goes along the vibrating line if the palatal arch is medium. If the palatal vault is steep, prosthetic flange doesn't reach the vibrating line. In case the patient's soft palate has a gentle slope, prosthetic flange should surpass the vibrating line by 2 mm.

Prosthetic flange on the mandible. When bypassing the lower lip frenulum, the denture flange goes through the neutral zone, skipping the buccal frenum, straight to the pear-shaped space. Depending on the mucous tubercle's mobility located here, denture flange can be placed differently. If mucous tubercle is dense and immobile, the prosthetic flange passes over it, and if it is mobile, it goes in front of it. Prosthetic flange from the side of the tongue is the oral cavity floor. However, if the internal oblique line is sharp, the prosthetic flange reaches it and does not come to the floor of the mouth. If the internal oblique line is smooth and arched, prosthetic flange is placed 3-4 mm below its level. The frenum of the tongue does not overlap the prosthetic basis.

In case of sharp atrophy of the alveolar process of the lower jaw, one must increase the area under the dental plate using hypoglossal space that stretches from tongue frenum approximately to the sixth tooth.

For this, full dentures made of hypoglossal rims are used. In the fourth Keller type when the denture tends to shift forward, the prosthetic basis should be extended till the pear-shaped space, or a denture with Kemeni pelota is made.

Since the quality of full dentures stabilization depends on artificial teeth-setup, this laboratory stage should be paid special attention to. Because the correct choice of tooth setup method and its diligent implementation will contribute to the success of making a denture for a toothless patient.

Part IV

TEETH PLACEMENT. ANATOMIC LANDMARKS AND FUNCTIONAL PATTERNS

Dental rows are articulated by biological and mechanical laws.

The only criterion that determines the correct articulation of artificial teeth is the presence of multiple contacts and smooth sliding of teeth in different phases of masticatory movements.

The main requirement of the classical balancing theory (by Gyzi, Ganau) is to maintain maximum contact during various movements of the mandible. Saving three-point contact in lateral and frontal areas by Bonviller is a sign of physiological articulation.

Gyzi and his proponents (1930) believed that the slope of the articular tubercle directs the movement of the mandible and that this movement is influenced by the tubercle's size and shape.

According to the balancing theory, constructing artificial dentition is based on 5 and 7 element articulation complex (Hanau's articulatory five and Vanshteyn's seven).

Monson (1918), Hall (1920) believe that the complex movements of the lower jaw are determined not by articular routes but by dental tubercle surfaces that determine the direction of this movement.

The spherical articulation theory is based on spherical structure of the skull and dentition overall and complex three-dimensional rotational movements of the mandible.

The aesthetic factor of prosthetic treatment

A full restoration of the exterior look in case of a complete loss of teeth is needed for all patients. However, it is impossible to restore occlusion that the patient had prior to tooth loss regardless of a patient's social status, profession or age, but it is necessary to consider data on the structure and functional state of the dental system prior to complete loss of teeth.

It is therefore necessary to study patient's photo with a smile and a model of the jaw of the patient made before removing all teeth and dentures previously used by patient to determine the size, shape of teeth, their location and slope, character of dental attrition, the degree of incisive overlap etc.

Clearly, along with knowledge of dental prosthetics, the doctor requires additional knowledge on aesthetics, painting and sculpture.

In terms of aesthetics, prosthetic treatment aims to reproduce the individual structure of the face and condition of dentition.

In the Vth century B.C. an outstanding Greek sculptor Polycleitus created a statue that was represented canonic proportions of body parts. He found that the length of the head is 1/8 of the body length and the length of the face is 1/10.

For orthopaedic dentist this “canon” is represented by orthognathic proportions of the dentition and its features – dental, muscular, and artrial characteristics along with distinctive profile of the face.

Knowing orthognatic features helps to shape most commonly occurring dental arches and occlusion patterns; however, precise reproduction of all individual features might pose a problem.

An important factor that determines the effectiveness of the prosthesis is the selection and the set-up of front teeth.

A correspondence between face shape and a form of central incisors was first discovered by T. Hall (1887) and subsequently by S. Barry (1906) and R. Williams (1913, 1920). Williams discovered three face types: triangular, square and oval, which correspond to the shape of the upper incisors (Fig. 58).

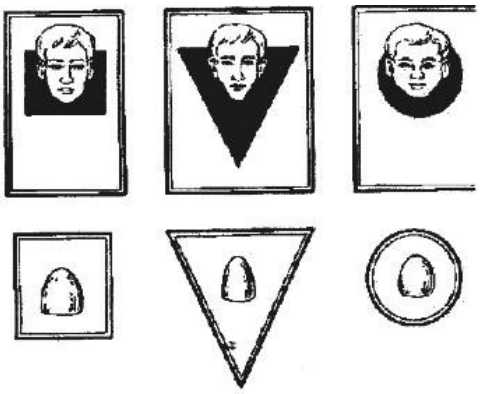


Fig. 58. Correspondence between face types and upper incisors by Williams

This pattern is taken into account when producing artificial teeth. Sets of frontal and posterior teeth are produced with albums that include 14 sizes and 13 styles of front teeth with schemes for selecting front teeth based on the face shape and the size of dental arches.

Correspondence of teeth and dental arches to the face shape is an aesthetic criterion called "Nelson’s triad" (Fig. 59).

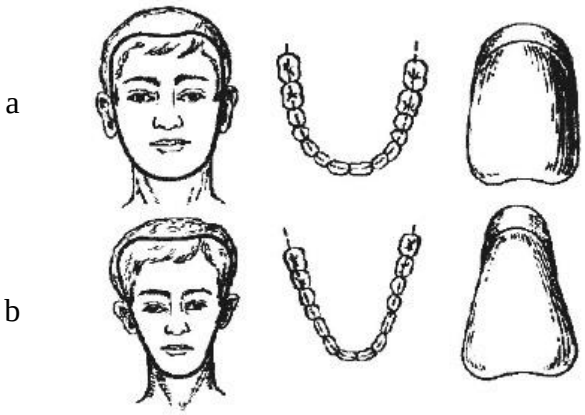


Fig. 59. Nelson’s Triad: a – rectangular shape; b – triangular shape

Some authors stress the connection between facial profile and contours of the central incisors: convex profile corresponds to convex teeth and straight profile to flat teeth.

A flat forehead and cheeks match flat teeth, bulging forehead and full cheeks correspond to teeth with a distinct equator.

As we know from orthodontics, shape profile corresponds to the type of occlusion: convex profile in prognathy and concave profile in the progeny.

However, artificial teeth are selected not only based on facial features, but also the size and colour taking into account gender, age, constitution, wishes of the patient, the type of nervous system etc. For example, men tend to have more distinct front teeth with a clearly defined shape. Older people's teeth are darker in colour, they also have clearly defined elongated necks, front teeth with abrasion (especially, canines).

Well-shaped teeth do not attract attention and do not spoil the overall impression of the person because they correspond to face type, configuration and certain individual traits.

Company "STOMA" and National Medical University have developed artificial "ESTEDENT COMPOSIT" plastic teeth, which differ from regular plastic acrylic teeth by decreased abrasion, higher hardness (40%), and colour stability. These teeth are made from polymethyl methacrylate (PMMA) with added silanized mineral filler. The teeth match the colours "Vita" (9 colour shades), there are upper front teeth in 13 styles: lower front -5, chewing teeth -5.

The set-up should be based on the principle of natural moderate asymmetry, namely dieresis between the teeth, turns and inclination of some teeth and their crowding, different levels of cutting edges of the front teeth (upper central incisors and canines are longer than the lateral incisors). The the medial surface of upper central incisors may be turned toward the palate while their distal surfaces may face the lips (in case the alveolar bone is wide).

Diastema and dieresis of artificial dental arch are recreated in dentures of wide-faced patients, in addition, they can be combined with flat cutting edge and setting the dentured up with minimal incisive overlap.

To determine the length and width of dentures a biometrics method is used which determines the correlation between the length and height of the face and that of the upper central incisors as 1:20, and sets the correlation between the central incisor width and width of the nose as 1:4. The width of the central incisor is ½ the width of filtrum labii superior, and also the width of the lateral incisor plus ½ of the width of a canine (the data is presented in the table).

Labiometry is performed to determine individual location of teeth in relation to the lip specifying the length of the upper lip and its type (Fig. 60).

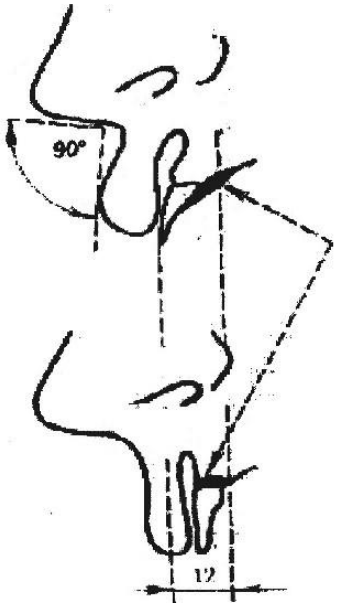


Fig. 60. Setting of front teeth relative to the nasolabial angle

Longer teeth without artificial gums are set if the patient has short upper lip, and the looming form of vestibular slope.

After studying smiles in the pictures of young people, American authors offer the following standards:

1) The upper front teeth and premolars are quite visible during smiling;

2) The outline of cutting surfaces of the upper front teeth should be identical with the outline of the lower lip;

3) Cutting edge of the upper front teeth slightly touches the lower lip.

The significance of phonetics in the design of complete dentures

Dentures often distort speech that's why the effectiveness of the prosthesis will increase if the physician will take into account the phonetic factor.

Most patients' speech production is actually normalized from 1 week to 1 month after the treatment due to the adaptive capacity of the oral cavity, lips, jaw, teeth, tongue and palate.

Intelligible speech is a measure of successful professional life for people of certain professions. Therefore, it is necessary to design dentures based on articulation.

Correct pronunciation and word formation depends not only on dental setting, but also the shape and thickness of the vestibular and palatal surfaces of the denture base, the width of the dental arch, occlusal vertical dimension, location of the occlusal plane, etc.

Pronunciation of sounds "Z" and "S" is often distorted. Given the fact that 90% of articulatory tongue contacts occur in the front area of the palate, it is important to pay special attention to the outline of gingival margin of front teeth, incisive papilla and transverse palatine folds when modelling upper jaw denture base.

To determine the angle of the front teeth in order to evaluate their placement in the vertical and sagittal planes, functional samples of "F" and "V" phonemes are used; pronunciation of sound "E" is affected by the

arrangement of the lower front teeth, the pronunciation of sounds "D", "T" – by the arrangement of the upper front teeth; pronouncing sounds "G" and "K" may be challenging if the denture base is thicker near the vibrating line.

Palatography method is used to study the tongue, lips and their interaction with the teeth when pronouncing certain phonemes.

Anatomical landmarks and rules of teeth arrangement

The combination of anthropometric landmarks correctly identified by physician and transferred to dental technician as well as the technician's knowledge of dentition's functional anatomy and his professional skills are the keys to successful prosthetic treatment.

Here you can see normal anatomical landmarks (Fig. 61).

1. Facial midline is required for symmetric arrangement of teeth on right and left halves of the jaw. It is determined by the ridge of the nose, infranasal depression and the centre of the chin.

2. The line of canines is located at the centre of canine vestibular surface and which determines the position and width of the upper front teeth.

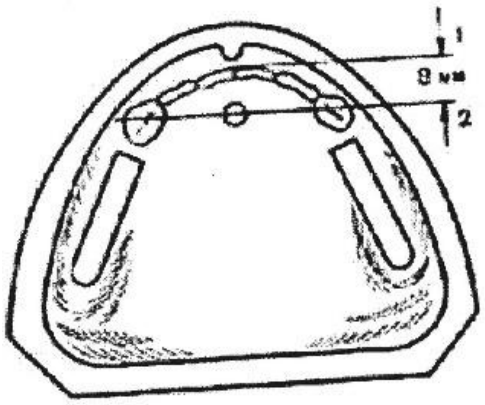


Fig. 61. The main reference points of front teeth arrangement:
1 – aesthetic centre of the face (middle line); 2 – line of canines; 3 – incisive papilla

3. Smile line is located 2-3 mm above the edge of the upper lip when the patient smiles; it determines the height of the upper front teeth.

4. Incisive papilla is located on the palate between the upper central incisors; this is a relatively permanent and unchanging anatomical formation.

Placement of artificial teeth is considered correct when front teeth are ahead of the incisive papilla at a distance of 8±2 mm, while the nasolabial angle is 90 degrees.

Given the fact that the front teeth shape the profile of the face, these figures correspond to the orthognatic correlation of jaws.

5. Prosthetic plane determines the level of upper jaw teeth placement which is parallel to the line of pupils and auriculonasal line.

6. Intrajaw correlations are determined according to the lines that connect the top of the alveolar processes of the upper and lower jaws (face line), which coincide with the axis tilts of artificial teeth. Facial prosthetic plane divides space into two equal parts according to the degree of atrophy of

the alveolar processes, if its level is close to the alveolar bone with more severe atrophy.

According to A. Gyzi, to ensure the stability of dentures and even distribution of pressure on the basis of denture, teeth should be put exactly on top of alveolar processes. He also proposed to measure the angle between the line and the plane of orientation. If this angle is 80-90 degrees, A. Gyzi proposes to place chewing teeth so as to overlap normal buccal tubercles of lower teeth by the teeth of upper jaw. If the angle is less than 80 degrees, the reverse arrangement of teeth in one area, two pairs of teeth or all teeth is needed.

7. Alveolar processes. If possible, artificial teeth are set on the alveolar process according to the natural location, that is, at the centre of the alveolar rocess in the middle of the cervix of artificial teeth. In case of minor atrophy, when placing prosthesis early or immediately, the middle of alveolar process is easy to define but it's far more difficult to identify it as the time passes. Maxillary alveolar process atrophies centripetally towards the top and back while the mandibular one – down and forward, from the centre out.

8. Retromolar triangle. In cases of significant atrophy of the alveolar ridge of the mandible, its middle can be determined by Pound's method (Fig. 62).

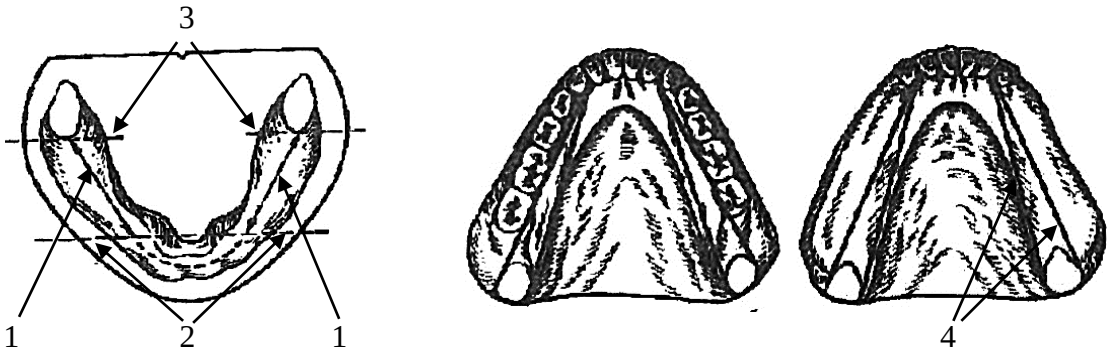


Fig. 62. Reference points for arranging teeth in the lateral parts according to Pound's methodology (Read further for the explanation)

1. Line (1) that connects the distal surface of the teeth (2) and middle mucous tubercle (3), corresponds to the top of the alveolar process of the lower jaw.

2. Two lines that go from the medial edge of canine tubercle to buccal and lingual surfaces of mucous tubercle (4) form a triangle that contains chewing teeth with defined glossal-buccal position.

In case of significant atrophy of the alveolar processes, teeth set-up should be placed within the "neutral muscular zone" or "zone of muscular balance" to stabilize the denture, therefore, it is the muscles of the tongue, lips, and cheeks (predominantly, orbicular, buccal and chewing muscles).

Shaping muscular balance area is performed employing a "functional finger impression method" in a closed mouth using stiff bases or

thermoplastic silicone mass. This method is called a "three-dimensional modelling" according to E. I. Havrylov and P. P. Tanrykulyiev.

The level of transitional fold, maxillary tuberosity, mandibular mucous tubercles, incisive papilla and other anatomic structures serve as landmarks for dental technician. They are drawn by a doctor on a plaster model and wax patterns for a dental technician to take into account and use as reference.

Front teeth set-up

Landmarks for denture set-up are a prosthetic plane, aesthetic centre of face, vestibular oval of occlusion rim, smile lines, and canines.

The location of front teeth also depends on the shape of the alveolar processes of the jaws and their centric relation.

The upper occlusal ridge should be shaped according to multiple factors including the form of alveolar processes (oval, trapezoidal or triangular), as well as face shape and contours of a patient's face (namely, side and front view of the face). You can also use photos and preferences of the patient and take into account age and gender.

Therefore, central incisors should be set exactly at the centre of the face while touching glass surface (horizontal plane) and with a small medial tilt (Fig. 63).

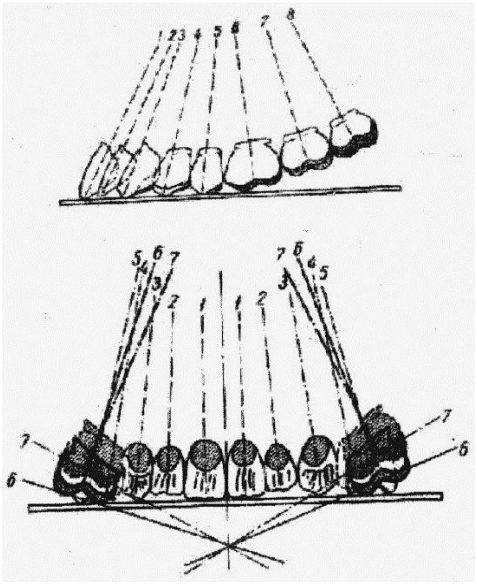


Fig. 63. Teeth set-up as relating to the occlusal plane. The explanation is in the text

The teeth necks are slightly immersed in the oral direction. Lateral incisors are set about 0.5 mm above the horizontal plane with greater mesial tilt and immersion of teeth necks inside. Canines touch orientation plane and somewhat extend vestibularly.

All front teeth are set based on vestibular oval. Cervices of central incisors correspond to the level of smile line, side incisors are slightly lower, and canines are slightly above it.

The lower front teeth have a slight tilt of the cutting edge. Cutting edge contacts the palatal surfaces of the upper front teeth. The lower teeth are slightly tilted in the glossal direction.

Teeth set-up in the side areas

The teeth are selected by colour, size, shape and material. The colour should match the colour and tint of the front teeth. The size and number depend on the anatomical features of the jaws and their relation.

Sagittally, length of the dental arches in the area of lateral teeth should not exceed the distance between the distal surface of the teeth and the base of mucous tubercle or maxillary tuberosity.

Sizes of teeth reduce at the account of lingual surface in glossal buccal direction because there needs to be an optimal support for cheeks and lips from the outside. The shape of the chewing surfaces of artificial teeth can be as follows (Fig. 64):

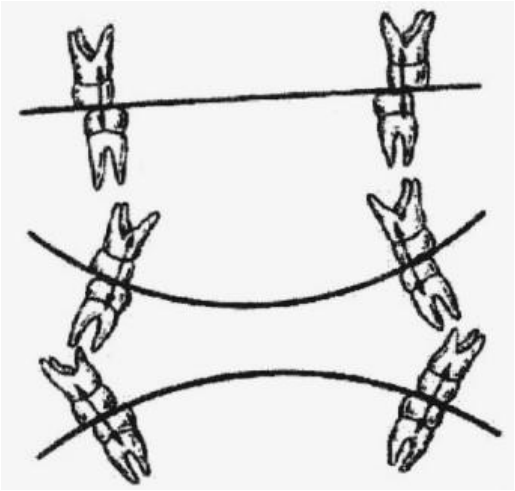


Fig. 64. Shape of the chewing surface of artificial teeth

1. Anatomical shapes that correspond to that of natural teeth with chewing slope tilt of cusps relative to prosthetic plane 20-35 degrees (Gysi A., 1929).

2. Non-anatomical or no-cusp shapes with small cusps according to Sears.

Anatomically shaped teeth are selected for young or middle-aged patients with minor alveolar process atrophy and thick mucous membranes and for patients who have recently lost their teeth, when it’s possible to achieve balanced articulation of dental arches.

At the same time, no-cusp teeth or teeth with flattened cusps are used in senior patients or elderly people with low muscle tone.

Plastic or porcelain teeth are used for teeth set-up.

In order to prevent dysfunction of joints and masticatory muscle parafunction, it is advisable to widely use porcelain teeth. Some researchers believe that porcelain teeth are most efficient at food grinding because chewing does not place too much strain on muscles and thereby prevents overload and atrophy of the alveolar processes.

Methods of teeth set-up

Anatomical teeth set-up according to Gyzi includes 4 options and it has great practical value. Therefore it is used as an independent method or as the basis of various modifications.

1st option is setting up teeth according to the horizontal (opposite) plane or an **orientation plane** (Fig. 65).

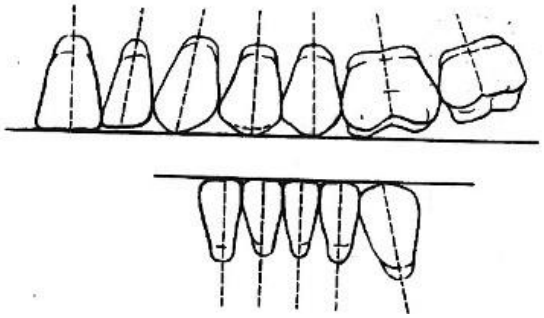


Fig. 65. Teeth set-up according to Gyzi as relating to the orientation plane (prosthetic plane)

Maxillary teeth should be placed within the prosthetic plane parallel to the Kamper line and 2 cm below the upper lip.

Indications for this type of set-up include:

1) Orthognatic correspondence of jaws;

2) A slight atrophy of the alveolar processes and a favourable maxilla-mandible relation;

3) Stable lower jaw position which helps to easily identify centric jaw relation;

4) The predominance of vertical movements of the lower jaw;

5) Presence of deep glenoid cavity (fossa) and extended articular process.

2nd option is a gradual set-up which is performed taking into account curvature of the alveolar bone of the lower jaw in the sagittal direction. The teeth are set in the lateral areas, parallel to the plane of the relevant parts of the jaw while changing the slope (Fig. 66).

It is necessary to improve the stabilization of the prosthesis to the mandible.

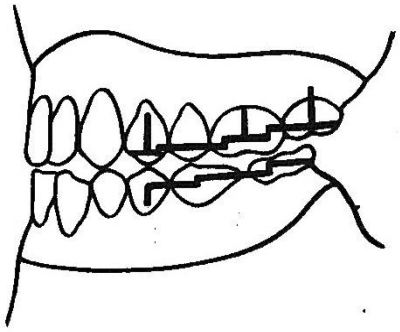
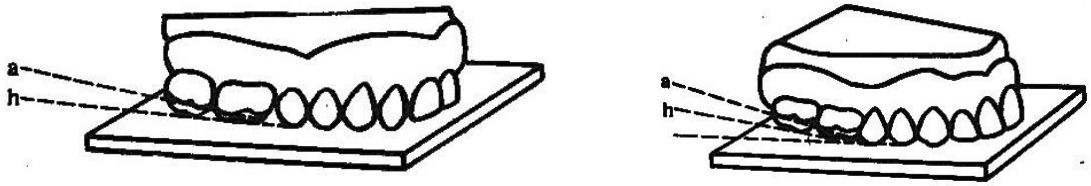


Fig. 66. Teeth set-up using stepping method by Gyzi



A B

Fig. 67. Setting chewing teeth with equalizing plane (according to Gyzi): A – at slightly elevated alveolar process of the mandible; B – at significantly elevated alveolar process of the mandible (a – equalizing plane; h – prosthetic plane)

3rd option is the most common and it involves setting of chewing teeth with equalizing plane.

Equalizing plane is an imaginary landmark that has an average value between the horizontal plane and the plane of alveolar process.

The teeth in the lateral areas of the upper jaw are set as follows:

4th – Prosthetic plane touches with buccal tubercle; 5 - both tubercles; 6- mesial-buccal tubercle; the rest of the cusps and all 7 are placed along the equalizing plane. The lower teeth should be set in close contact to the upper teeth except the canines.

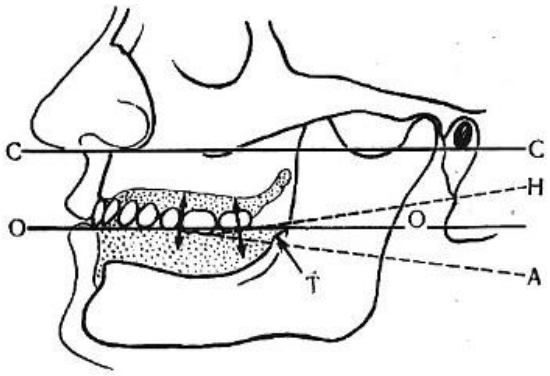


Fig. 68. Teeth set-up with "cusp" method (according to Gysi): C-C – Kamper line; O-O – actual prosthetic plane; H – equalizing; A – occlusal plane; T – alveolar tubercle on the mandible

4th option is **the method of mandibular tubercle** (Fig.68).

In order to improve conditions for stabilizing the prosthesis in the mandible, A. Gysi offers to use intraoral landmarks unchangeable with time.

According to this method, the orientation plane is determined by canine cusps line parallel to the Kamper line located 2 mm below the upper lip through the tops of mucous tubercles of the mandible. Premolars and first molars are set according to this plane. The second molar should be put on equalizing plane.

Hanau principles of teeth set-up

The Hanau method is based on the principles of articulation which coincide with the theory of Gyza, where temporomandibular joint is mostly responsible for moving the mandible.

Hanau considered that it was necessary to ensure connection of the 5 factors that define articulation to achieve a full value of functional dentures:

1) the slope of the articular tubercles;
2) degree of sagittal curve detection;
3) occlusal plane of the prosthesis;
4) angle of incisor tilt;
5) cusp height and angles of trabecular slopes of chewing teeth.

The author has analyzed interdependence of these factors and came up with 10 laws.

Investigation of these rules requires individual articulator, mathematical method for calculating individual paths of joint heads and anatomically shaped artificial teeth.

According to Hanau method, an equalized balanced dental articulation can be achieved by ensuring close and proportionate contact in central occlusion and smooth sliding of cusps with their multiple contacts at the working and balancing sides.

Teeth set-up in case of orthognatic correlation of toothless jaws as related glass according to M. E. Vasyliev

The setting is carried out in average anatomic "Gyzi-simplex" articulator on a glass plate that meets the horizontal plane, which after forming prosthetic plane is fixed on the upper occlusal ridges, then the articulator is closed while focusing on the contact of vertical pin and incisive pad, glass is fixed on the rim of bottom model, occlusal rim of the upper jaw is replaced by staged rim and artificial teeth are set according to anatomical rules by A Gysi.

The position of teeth relative to the centre of alveolar process is performed so that 2/3 of cervical part of front teeth are located in front of the centre of alveolar process and axis of lateral teeth pass through the longitudinal shapes over the alveolar ridge centre that provides stability of the dentures (Fig. 69).

Pre-cervical edge of the central incisors overlaps the edge of the lateral incisors and canines overlap central incisors according to the degree of labial surface's convexity.

The upper dentition creates as semi-ellipse, and the lower is parabola-shaped.

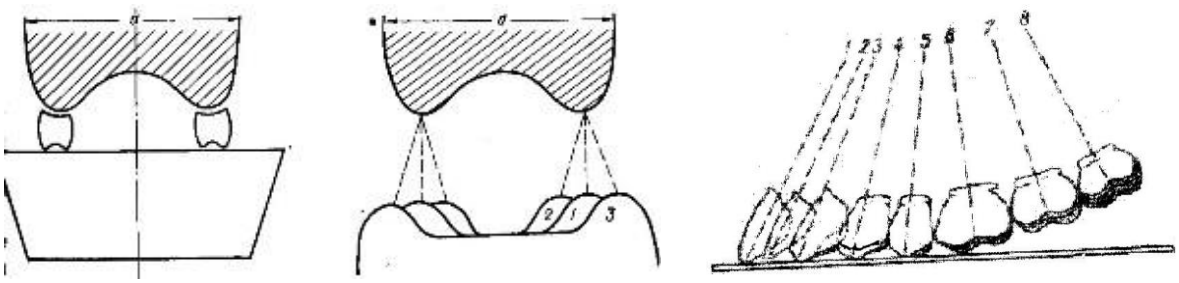


Fig. 69. Set-up of artificial teeth according to M.E. Vasyliev

Set-up starts with the upper central incisors, placing them symmetrically on either side of the cosmetic centre line so that cutting edges touch the glass. Cutting edge of lateral incisors is placed at a distance of 0,51 mm from the glass. Canine teeth touch the glass. The first premolar touches only by buccal tubercles, the second one touches by two tubercles. The first molar touches by anterio-palatinal one, the anterio-buccal is located at a distance of 0.5 mm, posterio-palatal - within 1.0 mm, posterio-buccal - within 1.5 mm. The second molar does not touch the glass, accordingly, posterio-palatal and posterio-buccal cusps are within a 2-2.5 mm of glass.

This arrangement of teeth in the lateral areas makes it impossible to build the sagittal and transversal curves in the shape of downward convex which provides multiple contacts on posterior teeth during movement of the mandible.

After setting the teeth on the upper jaw, the dentist separates the glass from the lower wax rim and sets the teeth on a lower basis in accordance with the upper teeth while constantly checking the accuracy of the relation of teeth in central occlusion and during lateral movements. In the case the sliding motion of the lower jaw teeth is impaired, the respective areas are grinded.

Teeth set-up according to H.P. Konyk

The technique was developed by H.P. Konyk who was an assistant at Prosthodontics Department of Poltava Medical Dental Institute. The author does not consider artificial tooth as a separate functional unit that withstands chewing load. The occlusal surface of designed dentition is able to transform and transmit the load through denture base on the mucous membrane and alveolar process.

With the help of special U-shaped device, the author ensures the necessary orientation, the positioning of the top models in articulators' space and fixing it. This ensures more accurate spatial orientation of top model than with the device made by M.E. Vasylev. The author developed a "universal device" for installation and teeth set-up models which consists of a removable oval organic glass plate, fastened with screws to the wall, located in the opening of the lower frame of the articulator.

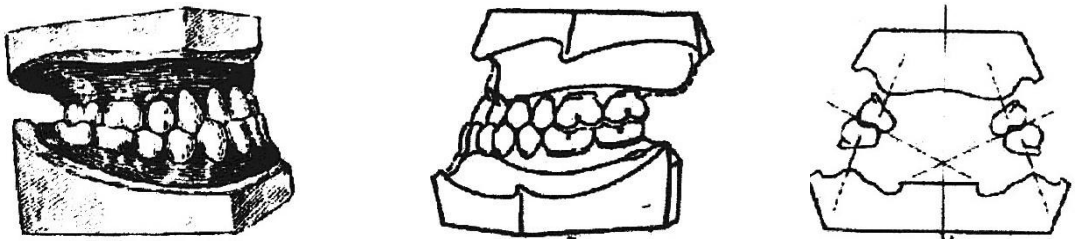
The middle of alveolar processes of the upper and lower jaws is drawn using glass-marking pencil then the dentist identifies the central line between them along which the cervixes of artificial teeth are placed. To ensure smooth movement of the mandible it is mathematically justified to reduce surface curvature of closing dentition, because the distance from the glass surface, compared with method by M.E. Vasylev is reduced by the author by almost twice.

Setting up of artificial teeth for different types of occlusion

Teeth set-up in case of progenic relation of toothless jaws (medial occlusion)

After complete tooth loss and subsequent atrophy of the alveolar processes, the correlation of jaws is disrupted: the lower jaw is positioned ahead of the upper one (secondary, senile progeny). Moreover, possible

presence of congenital progenic relation of jaws and tooth loss further emphasizes the discrepancy in the size of the upper and lower jaws (Fig. 70).



a b

Fig. 70. Anatomical teeth set-up in case of mesial (progenic) relation of toothless jaws: a – side view; b – a cross-section

The setting of front teeth is done to form edge-to-edge bite in case of minor progenic relation of jaws.

If the progenic relation is severe, the front teeth are placed according to individual extent of mesio-occlusion in the vertical and horizontal planes.

Upper right chewing teeth are placed on the left side of the lower jaw denture, upper left - on the right side of the lower jaw implant (cross setting). Critics believe that cross setting does not provide cross-chewing efficiency and stability of the prosthesis and also decreases the space for the tongue, causes speech impairment and increased risk of biting lips.

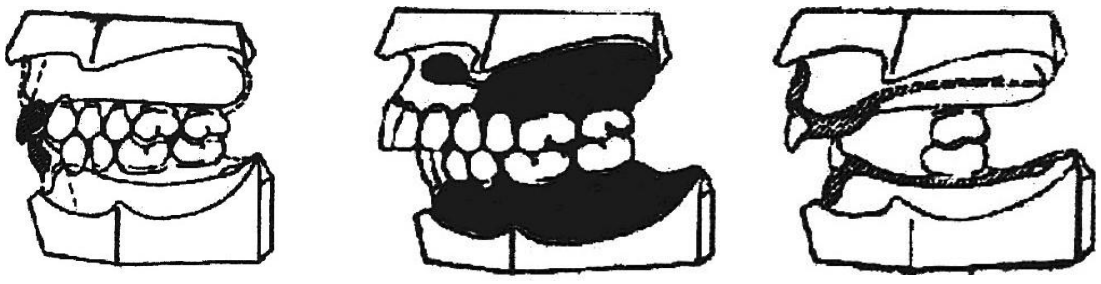
Upper dental arch is shortened by two teeth due to 5's.

Compensation curves are created with less curvature, fourth come in contact only with buccal tubercles, sixth - with front buccal and palatal tubercles, seventh - only with antero-buccal protuberance.

Teeth set-up in case of prognathous relation of toothless jaws (distal occlusion)

When setting teeth in case of over-developed upper jaw, the lower dental arch is shortened by two first premolars, resulting in lower canines being located between the upper teeth and the first premolars.

The lower front teeth are set with cutting edge slopes turned forward. In case of severe prognathy it is impossible to establish contacts between the frontal teeth, so the stability of dentures during biting is achieved by creating a biting space for frontal teeth on the surface of palatal implant (Fig. 71).



a b

Fig. 71. Anatomical teeth set-up with distal occlusion:
a – pelotte processes; b – biting plate on the frontal area of the palate

The upper front teeth are placed without artificial gum base "in contact" with gum plastic dental clammers or reinforced by pelottes.

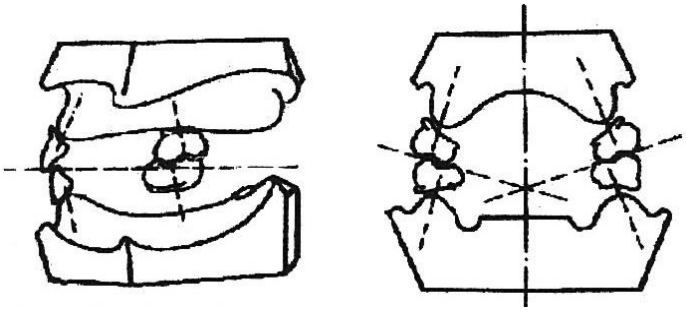


Fig. 72. Anatomical dental set-up in case of direct relation of jaws

Setting teeth according to spherical surface

The spherical articulation theory (Monson, 1920) was based on the provisions of Spee (1890) and Wilson (1918) about sagittal and transversal curvature of the dentition (Fig. 73).

According to this theory, buccal tubercles of teeth are located within spherical surface and extended axis of the posterior teeth are connected in a certain point in the skull on crista galli. The radius of the spherical surface is 10.4 cm. Monson offered a special articulator for setting the teeth.

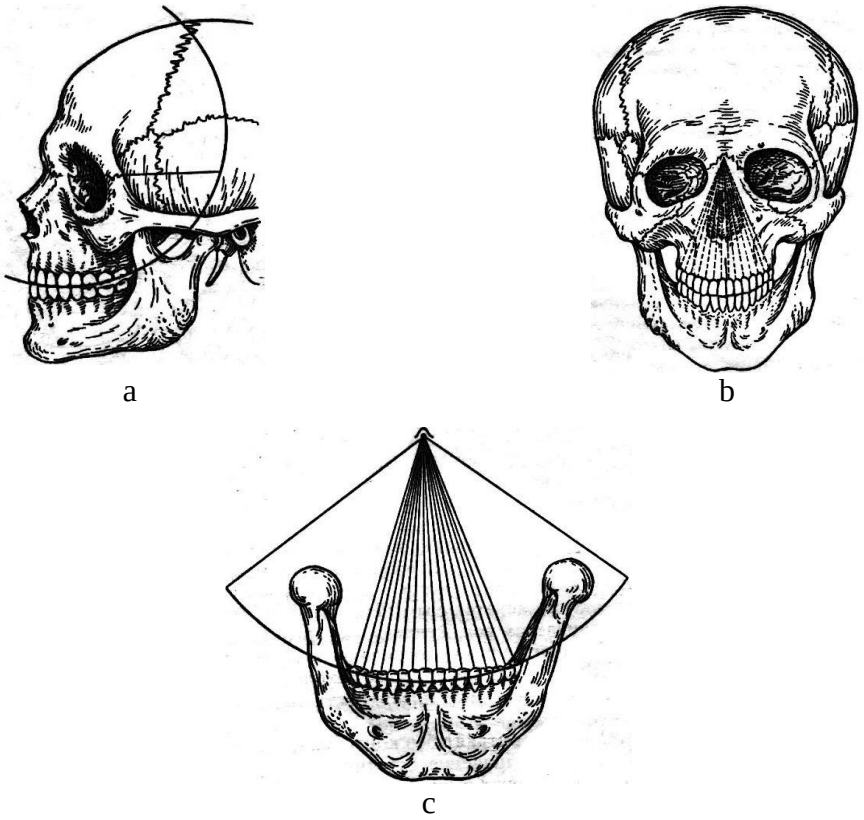
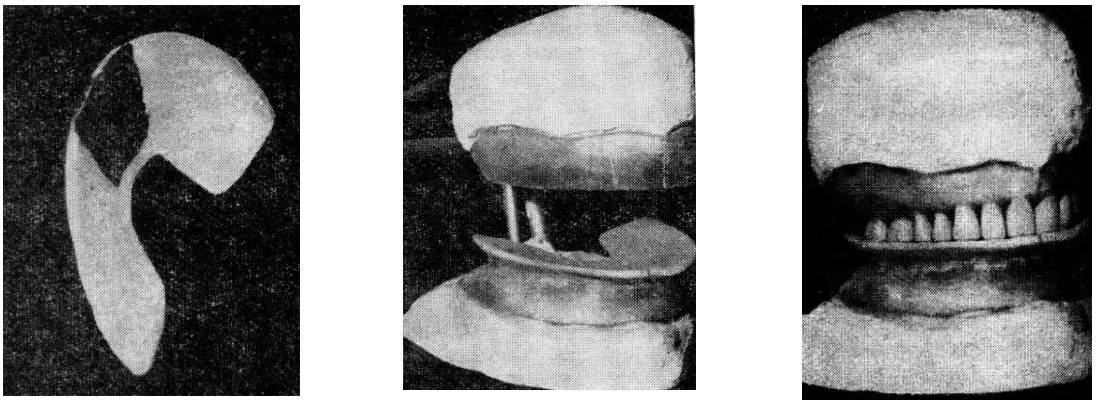


Fig. 73. Sagittal (a) and transversal (b, c) distortion of dentition

B.T. Chernyh and S.I. Hmelevskii (1956, 1972) have theoretically proven the spherical structure principle of human dentition from physical and

mathematical points of view. They concluded that the occlusal surface of the dentition is part of spherical surface. The size of custom spheres of indifidual spheres ranges from 8 to 16 cm, from 4.8 to 20 cm and depends on intraalveolar relations and patients' age.



a b c

Fig. 74. The method of setting teeth on a spherical surface,
a – calottes; b – establishing callottes on the lower platen; c – setting up maxillary teeth

Teeth set-up is done using standard metal placing platforms (calottes) or concave horseshoe shaped plastic (Fig. 74).

M.A. Napadov and A.L. Sapozhnykov (1972) suggest an average radius of the sphere to be 9 cm. Placing field consists of three parts: two lateral platforms with a spherical surface and radius of 9 cm and the front horizontal platform in the form of a sector. Lateral parts are connected to the front platform by a hinge.

Spherical teeth set-up with the radius of 9 cm corresponds to anatomic teeth set-up using glass. The method is as follows:

1) Determining the height of lower part of the face;

2) Tightly fitting sphere to the lower wax occlusion rim;

3) Correcting the upper rim according to the movements of the lower jaw;

4) Fixing the position of central occlusion;

5) Setting up maxillary teeth;

6) Setting up mandibular teeth.

In this procedure, artificial no-cusp teeth or teeth with low tubercles are used: for wide-faced type a flat sphere is used while narrow-faced type requires a concave one.

Spherical surface dental set-up method is indicated in case of pronounced progenic jaw relation when interalveolar lines create a 70 degree angle in relation to orientation plane.

A. Pleasure (1937) argued that the highest stability of dentures could be achieved by setting premolars and first molars on anti-Monson curve and the second molars – on Monson curve. Such set-up and application of no-cusp teeth prevents the transfer of a denture towards the cheek.

Kurt (1940) proposed three types of set-ups (Fig. 75):

1) on a horizontal plane parallel to Kamper line (a);

2) with a 60 degree deviation (b, c);

3) on the spherical Monson surface (d);

4) on a spherical surface of Plezyur or Avery - on anti-Monson curve (d).

Teeth set-up according to grind occlusal ridges taking into account individual movements of the mandible

Constructing rational dentures for toothless jaws is a complex biochemical task solving which should be based on the laws of mechanics. One should keep in mind that the articulators of average figures do not account for joint asymmetry which is common in humans.

When setting artificial teeth in toothless jaw dentures, one must create occlusal surface that compensates possible separation of the teeth in the area of mandibular molars during the forward movement of the lower jaw.

In 1929, H.A. Efron postulated the following in his work titled "Anatomical articulation without the help of articulators":

1. All technical work should be performed in the laboratory, it should rather be simplified than complicated;

2. The height and type of the bite as well as the formation of sagittal and transversal occlusal curves and incisive slide is determined by the prosthetic doctor at the clinic.

The author refers to the fact that the head of the patient is a perfectly accurate articulator which is individual in each clinical case.

The point of H. A. Efron’s technique comes to getting a kind of bite in which the sagittal and transversal curves based on Christensen phenomenon are formed.

According to H. A. Efron’s technique wax patterns defining the central occlusion are used and then it is plastered in the standard occludator.

A dentist carries out placement of six upper and six lower front teeth. Wax balls are placed in the the section of second lower molars, the templates are introduced into the mouth, and the patient brings the jaw forward till the occlusion. In the state of central occlusion, a layer of wax from the upper rim is received according to the lower rim to enable a comparison thereof. This creates a sagittal compensation curve. After finally forming rims maxillary teeth set up is performed using the bottom shafts, then the lower teeth are placed according to the position the upper teeth.

The disadvantage of the method described above is that the wax patterns are easily deformed, and front teeth that completely controlled incisor movements, are not kept in wax patterns. In addition, front part of hinge occludator springs, that’s why there’s a risk of lowering of bite and deviation from normal correlation of dentition. The technique is complex and copy paper is very time-consuming for a doctor.

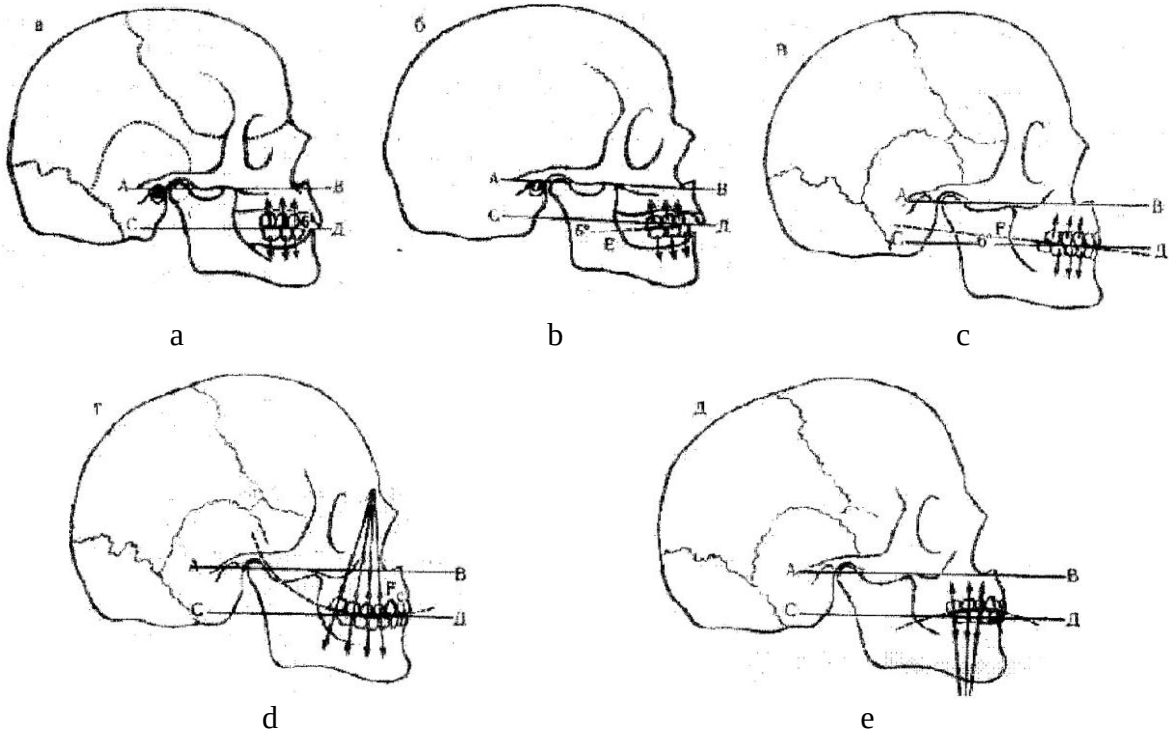


Fig. 75. Set-up types according to Kurt:
a) Kamper parallel lines; b) with deviation; c) with 60 degree deviation; d) on the spherical surface of Monson; e) on a spherical surface of Avery or Pleasure – on anti-Monson curve

Methods developped by A.Ya. Kats and Z.P. Helfond (1937) provide for eliminating the aforementioned drawbacks, namely the replacement of wax patterns by stens, changing occlusal curve shaping methods and subsequent rising of the teeth, making structural changes to hinge occludator while transfering bite hight pin from back to the front part of occludator.

In the proposed method, occlusal rims roughly correspond to the width and height of the dental series. Locations of rims on the alveolar crest, as well as the height of rims and the relation between them are adjusted in a patient's mouth. By the end of rim correction, a patient sets the jaw in the position of relative physiological rest due to the fatigue of masticatory muscles; to some extent this facilitates determining the correct central occlusion.

Sagittal and transversal curves are formed using Christensen phenomenon. Full correspondence of occlusal surfaces of rims is reached by grinding using slurry of pumice or sandpaper.

Thus, Katz-Gelfond technique makes it possible to increase the functional value of dentures and reduces error rates in determining the central occlusion.

This method of I.T. Miroshnychenko and H.B. Shylova was developed at the Department of Prosthodontics in PMSI, by using stens rims mounted on rigid plastic bases individual occlusal surfaces of the dentition are formed while taking into account Christensen phenomenon. Rimcarborund sand is added to the stens of upper rim.

After introducing patterns into the mouth, and their height adjustment for severity of Christensen phenomenon, stens balls are added to the side areas of the lower wax rims added.

A patient is asked to push the lower jaw forward and to close the rims in front occlusion to complete the triangular slits formed in the side sections, then stens is cut in lateral areas of the upper triangular rim according to stens that was added to lower wax rims.

According to Katz-Gelfand method, a patient is taught a 20-minute set of exercises for the mandible. Due to the formation of the occlusal surface of the rims, the patient sets the lower jaw in position of relative physiological rest, which to some extent facilitates determination of the correct central occlusion.

It is characteristic that in Miroshnychenko-Shylova method, the height of the lower rim in the upper rim stens is reduced during grinding in the presence of abrasive substance (Fig.76). This is the advantage of the method, because the requirement not to reduce the height of the upper rim after determining its height and building prosthetic plane is met.

After the procedure, while controlling the relation between the rims and a certain height of bite, a dentist receives functional impressions and fixes the position of the central relation of the jaws. The lines for setting up teeth are drawn.

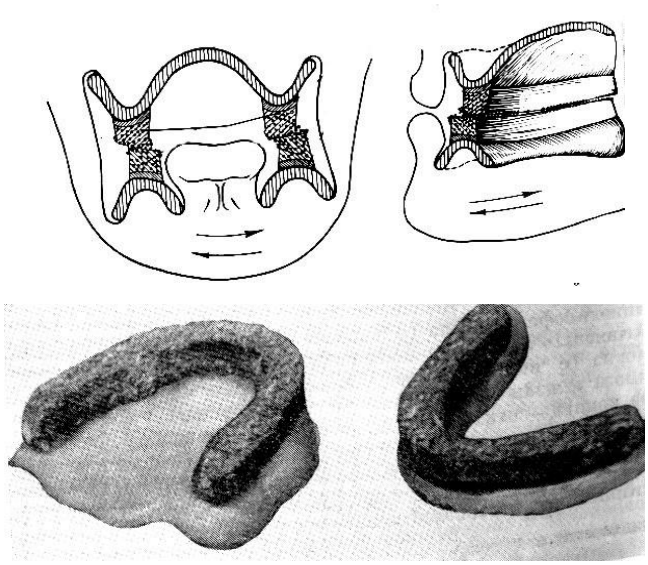


Fig. 76. Forming of individual occlusion curves using Miroshnychenko-Shylova technique

Models with templates are plastered in hinge occludator. In setting up teeth there can be options when they start setting of the upper jaw or lower one (the technique developed by the department), given the need to set teeth in the frontal area under the centre of the alveolar process, and in lateral sections – according to Pound's method. The set-up of teeth is performed tangent to the occlusal surface of the opposing jaw (Fig. 77).

Fig. 77. Setting teeth according to individual occlusal curves using Miroshnychenko-Shylova method

Analysis of teeth set-up methods indicates that when it comes to choosing the form and shaping occlusal surface of the dentition, there is no standard solution. Orienting staged plane of interalveolar space is a complex problem of articulation which has not been fully resolved.

The success or failure of the prosthesis in patients with complete loss of teeth is largely dependent on properly conducted by a physician and dental technicians design phase of dentition.

VERIFICATION OF THE DESIGN OF COMPLETE REMOVABLE DENTURES. POSSIBLE ERRORS AND WAYS TO FIX THEM

After setting up teeth, a wax model of the future dentures is checked in the mouth of the patient. This is necessary in order to verify the accuracy of all previous procedures: correct identification of the central relation of the jaws, the choice of colour, size and shape of the teeth, the relation of them in central and lateral occlusion, correct location of teeth relative to the alveolar ridge and midline of the face, and so on.

Checking denture's design comes to: 1) reviewing jaw models; 2) inspecting teeth set-up in occludator or articulators; 3) examining wax pattern with teeth in the mouth.

Working models of jaws on which denture bases will be produced must be thoroughly examined. They are thrown away in case of fractures, blurred contours of denture-bearing area, defects on the surface of foundation area and others. One should keep in mind that it is always better to get functional impressions again than to use a questionable model.

Then a dentist checks the setting of teeth in occludator or articulator before dental wax patterns will be introduced into the oral cavity. He needs to pay attention to teeth's colour, size and shape as well as the size of incisive overlap. Older people have teeth with darker colour than the young that is why it is inadvisable to use light fittings on them. Sometimes it is recommended to put teeth with long necks that mimic periodontitis. Sometimes a so-called cosmetic teeth set-up is used to hide the artificial teeth in older people. In this set-up, front teeth are arranged abnormally, upper central incisors are placed to overlap one another, the medial side of the lateral incisors is turned, and transverse triangular spaces are formed in the area of dental papilla.

The upper front teeth are placed so that the lower two thirds of them are in front of the middle of the alveolar ridge and one third is inside of it. Sometimes this rule is violated in other conditions of anatomic retention and teeth are placed far ahead (upper lip sinks, little room for the tongue, etc.). It is necessary to avoid upper incisors overlapping the lower ones by more than 1-2 mm, because it might disrupt denture's stabilization. One should also avoid significant overlap of lower buccal tubercles by corresponding upper molars. Pronounced cusps, especially canines should be grinded, so that to ensure sliding in lateral and anterior-posterior movements.

One must also check the relation of teeth to the alveolar ridge. Observe the following rules: lateral teeth of the upper and lower jaws and front lower teeth should be located strictly in the middle of the alveolar ridge.

Then you should check all occlusal contacts of lateral teeth with vestibular and palatal sides. If the set-up was performed in dental articulator,

the occlusal contact in the anterior and lateral occlusion is checked. All defects that were identified should be eliminated. Then a dentist needs to pay attention to wax base modelling, depth of its edges, close fitting to the model.

After a thorough examination, the teeth and wax base are wiped with alcohol and introduced into the oral cavity to check if the intra-alveolar height was identified correctly along with other components of the central relation of jaws. Intra-alveolar height is controlled using anatomical and functional method using speech sample, if the fixation of wax bases allows it. The distance between the front teeth of the upper and lower jaw during speech is approximately 5 mm.

Errors and methods of their elimination:

1. Errors in the vertical plane (decrease or increase of the height of the lower part of the face)

Increased intra-alveolar height gives a patient a somewhat surprised look, nasolabial folds and submental fold are smoothed, slit in the anterior part is less than 5 mm, an interval of 2-3 mm during physiological rest is absent, sometimes there is teeth clatter during speech. Correct errors in two ways.

If the upper teeth are in proper relation to the upper lip and their occlusal plane is not impaired, intra-alveolar height should be reduced at the expense of the lower dental prosthesis. They are removed and a new occlusion rim is made for wax base, then the intra-alveolar height and central relation of the lower jaw should be identified again. After that, the top model is separated from the articulators; it is mounted on the bottom in the new position and plastered in the articulator for setting up the lower teeth.

Increased intra-alveolar height can still be combined with the wrong calculation of the height of the upper occlusal rim in the anterior part. In this case the upper teeth protrude from under the upper lip, distorting a smile. To fix this mistake, artificial teeth are removed both the top and bottom of the wax bases. Wax rims are placed on the basis and then the central relation of jaws is defined.

In case of decreased intra-alveolar height, if the upper dentition is set right, the dentist should act accordingly. Softened wax strip is placed upon the lower dentition and the patient is asked to close his teeth to establish the desired height. Once the wax hardens, the prosthesis is removed. The top model is separated from the articulator, set to a new position and remounted.

2. Errors in determining the neutral position of the mandible (transversal, sagittal)

When checking the central value, there may be two mistakes: wax rims have fixed a front or one of the lateral occlusions.

If instead of the central occlusion there has been fixed the front occlusion, cusp contact occurs only in lateral teeth in central occlusion position when teeth are closed and gap is formed between the front teeth and the height of the central relation to the height of cusps is increased (Fig. 78).

Fig. 78. Error in the sagittal plane (instead of the central occlusion, a front occlusion is identified)

This error is caused by the habit of patients who have lost all their teeth to push the lower jaw forward. If this error is discovered, it is necessary to remove teeth from the lower wax base, to make new bite roll again and to determine a central relation of jaws. It is recommended to leave the front teeth of the upper and lower jaws on wax patterns during the re-evaluation and to set wax rims in the lateral areas to prevent possible moving forward of the mandible.

If one of lateral occlusions (right or left) was fixed by wax rims, the cross-bite occur with closed teeth in a central position, displacement of the centre of the lower teeth in the opposite direction, cusp contact on the opposite shift side, the gap between the lateral teeth on the side of displacement, increasing of bite (Fig. 79).

Fig. 79. Error in the horizontal area (instead of central occlusion is defined right side)

In this case, repeat the determination central value of jaws.

After validation of definition of occlusal vertical dimension and central position of the mandible check the density of contacts artificial teeth. If the examination of the design of the prosthesis occurs between separate teeth-antagonists are no contacts, restore them.

3. Fixation of central relation while crushing the base or occlusal ridges

These errors may arise in cases where occlusal rims with patterns bite is not reinforced arch-shaped wire, especially in the lower jaw where alveolar part is very narrow. In establishment such bases on the model shows that they tightly adjacent to them. In clinical manipulation of this error is found in the

form of increased bite on uneven and uncertain cusp contact side tooth gap in the area of the front teeth. To correct the errors it is necessary to re-define the central value of the jaws with new wax rims, sometimes with rigid bases.

4. Fixation of central relation in the shift jaws of a wax bases in a horizontal plane

When fixing the central value of the jaws of unfavourable anatomic conditions in the oral cavity (atrophy of Keller alveolar processes of second degree and third degree by Schreder) may shift forward or backward upper or lower often wax bases with occlusal ridges. During the examination of the design of the prosthesis can be observed the same pattern as in fixing the mandible in the front or rear relations (Fig. 80).

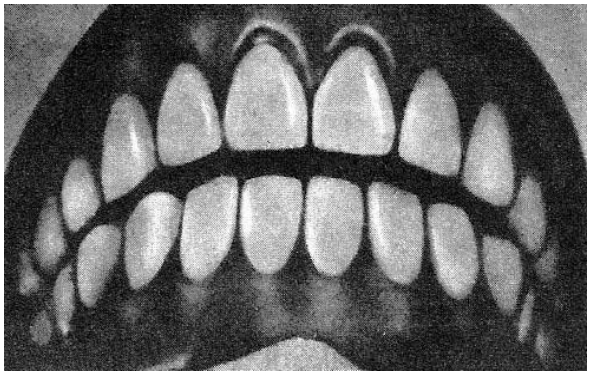


Fig. 80. Correspondence of dentition when shifting down the upper platen

Error is corrected through new wax rims, fixed on rigid bases, re-defining the central value jaws. Further to these bases rigid plastics conduct teeth set-up and check the design of dentures. Hard bases are resistant on the jaw, they are not deformed and do not shift as wax. When checking the design of the prosthesis, in all cases where errors have been detected and corrected, the top model is separated from the articulator and locked in the new position.

5. Mistakes arising from sagging or gapping wax rims to foundation area (model)

Errors arise from uneven compression bite wax cylinders while fixing the central value jaws. The reasons can be loose fitting to wax base model, not careful adjustment of the lower rim to the upper or lower rim uneven heating of hot spatula. When checking the setting of teeth these errors manifest lack of contact between the chewing teeth on one or both sides. For their discovery between the chewing teeth injected cold spatula and turn around its axis. It was at this time you can see how tight wax bases to foundation area. To correct this error in the area of posterior teeth impose plate heated wax and re-define the central value.

Remember that the absence of prosthetic plane parallel to horizontal lines considerably impedes reproduction of occlusal curves of artificial teeth, breaks the uniformity of contact between the tooth rows of the upper and lower jaws, chewing function, dental articulation. Because high or too low

placement of prosthetic plane negative impact on the patient's face; violates the speech function and stabilize dentures.

Checking prosthesis design, do not forget determination of aesthetics. It is necessary to carefully check proofing cutting edges of the front teeth from under the upper lip during speech, a smile and canines position relative to the corners of the mouth. The lines between the central incisors upper and lower dentition must be in the same plane coincide with the midline of the face. The shift it in either direction makes unattractive smile. Check the adequacy of the size, style teeth type face. With age, teeth darker, so the elderly should be put darker teeth. Milky white teeth elderly person immediately cast doubt on their nature. To hide the artificial teeth sometimes middle incisor put in an abnormal position or on one of the front teeth creating dark spots.

Checking the design of the prosthesis is completed by clarifying the boundaries of the foundation areas on the model. Thus, the palatine roller, bone protrusions on the alveolar process, the area of the incisor papilla, if it was hypertrophied, should be coated with insulating foil to exclude them from contact with the basis of the prosthesis.

CORRECTION AND INSERTION OF COMPLETE REMOVABLE DENTURES. EVALUATION OF THE EFFECTIVENESS OF PROSTHETICS. ADAPTATION. FUNCTIONAL ASSESSMENT OF THE QUALITY OF COMPLETE REMOVABLE DENTURES

After laboratory stage the prosthesis is transferred to the clinic. First, it is examined outside the oral cavity.

This phase begins with the review and assessment of manufacturing quality prosthesis outside the oral cavity.

Start of detecting of visible to the eye and palpable sharp edges, protrusions irregularities on the surface of the base, especially the return to the mucosa. Basis prosthesis must be of uniform thickness on the outside polished to a shine, including the interdental spaces, have no foreign matter. Plastics colour and transparency must meet standard requirements, artificial teeth - the same colour, symmetrical, with a corresponding slope curve.

Check-up of prosthesis in the mouth

Overlay of toothless jaw prosthesis does not cause difficulties. They arise later, while eliminating various defects which occur during the patient's addiction to the prosthesis. Some of these defects are detected on the basis of patient complaints, some - in the oral examination and occlusal relations artificial dentition. Exceptions are cases where a hump on the upper jaw is pear-shaped, and available on the bottom in deep undercut retroalveolar area. In such cases, the upper jaw with one hand cut edge of the prosthesis to the most protruding part of the hill, and the lower jaw prosthesis impose promoting his back first, and then - down and forward. Sometimes hump upper jaw is low and long back edge of the lower denture rests on it. Basis, contacting each other,

Check the density of closing of dentition and fixation of the prosthesis after entering the dentures in the mouth. When putting on the prosthesis foundation area it has imposed freely, without force evenly cover the alveolar processes. After teeth set-up occludator contact point between the teeth, so between the dental series put articulation paper, ask the patient to close the teeth and jaw to move forward, backward and sideways. Dark tracks that appear on the prosthesis slightly grind forming facet. Thus, dropping points are eliminated on the prosthesis.

During the appliance of the prosthesis you can identify technical and clinical errors.

Technical errors:

- if the plastic is not pressed, then the denture base is thickened, the bite is overstated, sometimes there is a humpback contact between the teeth;

- sometimes, cracks on the models (often the lower ones) appear when the plastic is pressed, and bite fragments are distorted due to displacement. Therefore dentures in these two cases require the processing;

- shortening of the denture boundaries and thinning of the denture edges by the dental technician violate the fixation. This error is corrected by repositioning the prosthesis or its borders.

Clinical errors:

- associated with incorrect jaw as a central value in vertical and horizontal directions. Thus, the imposition of complete dentures can increase or decrease the occlusal vertical dimension, fixed side or front occlusion, errors in closed custom tooth prosthesis mismatch margins of foundation area, deformations basis, etc. These defects could go unnoticed when checking teeth set-up on wax and be the result of technical errors made in the process of making the prosthesis.

Without closed front or side teeth, dentures presence of cross-bite should be processed. When setting the upper teeth prosthesis is correct, then correct the mistake by reshuffling the teeth on the lower base. With a lack of teeth set-up on the upper prosthesis it is necessary to perform repeated teeth set-up on the top and on the bottom base.

If the closed of lateral teeth on one side is observed only, but face the correct height, the gap between the artificial teeth should be placed Softened wax plate, suggesting the patient to close the teeth. For wax impressions make dentures in occlusion and central position in the articulator mount setting to correct teeth.

When reducing or increasing the occlusal vertical dimension the tooth rows must be removed to produce wax denture base wax rims, face determine the height of the central position of the mandible and perform a new production of teeth. It is not necessary to increase the dental rows with high-speed plastic for lowering or to grind them for increasing the occlusal vertical dimension, as it is not possible to create a corresponding chewing surface relief.

If the edges of the prosthesis and the extension of pressure sores, prosthesis displacement for the same reason corrected edge in their respective areas under the control of functional tests.

Serious drawback is the shortening of the edges of the prosthesis, which in most cases is a violation of the locking valve and poor fixation of the prosthesis. Edges specify accordingly. Grind the edge of the prosthesis and it imposes roll of wax or thermoplastic mass. Edge denture gently heated to become layered of weight plastic, prosthesis introduced into the mouth and forming his land using functional tests. The best use for this purpose is silicone paste. Then eliminate denture, remove the excess weight on the edge and if necessary, repeated manipulation until they reach a good fixation. Wax or impression mass base materials continue to replace conventional manner.

Extend the edge of the prosthesis can be simultaneously using the quick plastic. To this end grind prosthesis and moisturize monomer. On the surface prepared thus impose dough and injected plastic denture in the

mouth. Edge also is formed the prosthesis with functional tests. When the plastic becomes quite elastic and not deforms, denture withdrawn from the mouth and place it in polymerizes 5 - 10 minutes. 5-6 atmospheres of pressure. After complete curing of excess the plastic is removed. This method has disadvantages despite the convenience, because the plastic eventually quick-changing colour and polluted due to porosity.

In case of violation of the locking valve in the vibrating line the fixation of the prosthesis during a bite of food, coughing, speech is disrupted. To address this shortcoming can use the appropriate technique. The back edge of the prosthesis stick strip wax or thermoplastic masses (you can use the dough-early plastic). The prosthesis is introduced into the mouth and you should ask the patient to close the teeth in central occlusion position. Then the prosthesis is removed, remove excess impression mass. Edge prosthesis slightly warmed in hot water, in order to make and again a lot of plastic and injected denture in the mouth. In most cover the mouth when the soft palate is not tense, one hand holding the prosthesis and index finger forming a second final locking valve, pressing mass on the edge of the prosthesis up. Then a lot of impression is replaced with plastic laboratory method. This manipulation can be carried out using a silicone mass.

Balancing prosthesis is the result of many mistakes, inaccurate reflection in the impression foundation area, no isolation palatal rim crack model. Finding balance is appropriately rebasing prosthesis. From his base on the side facing the mucosa, dental cutter remove a layer thickness of plastic1 mm. Knead the dough with plastic quick-impose it on the basis of pre-moistened with monomer. The prosthesis is placed upon the foundation area and you should ask the patient to close the teeth. Before that, he offered to rinse your mouth with a solution of soda. The mouth should be rinsed after relocation. When the plastic becomes sufficiently elastic, the prosthesis is removed and its surplus.

Old dentures that have lost their stability can also be repaired. However, this measure should in all cases be regarded as temporary. The corrected prosthesis can only be used during the time when a new one is being made, as high-strength plastics, as noted, are poor basic material.

Check-up of the fixation and stabilization of manufactured prostheses

The fixation of the upper jaw prosthesis is checked by removing the prosthesis. The fixation of dentures in the anterior parts is concluded when trying to remove the upper denture, holding it by the cutting edges of the front teeth down, and the prosthesis of the lower jaw - up. The fixation of the upper denture in the lateral area is checked by covering it with the thumb and forefinger in the area of the premolars and the force of the posterior valve in the area of the soft palate is determined by pressing on the palatal surface of the cutting edges of the anterior teeth in the vestibular direction. On the lower jaw fixation of the base in the distal areas is determined in the same way alternately on the right and left sides.

Tests for fixation (N. V. Kalinina)

1. If the mandibular prosthesis rises slowly and evenly, it is necessary to gradually reduce its length vestibular edge sections fit under masticatory muscles.

2. If the prosthesis is shifted in the back up, the length of the lingual edge of the prosthesis below the maxillofacial line must be shortened.

3. Moving of the prosthesis forward means that it is too elongated in the retromolar and adjacent lingual areas.

4. Shifting back the prosthesis depends on several factors:

a) Too extended lip edge of the prosthesis;

b) The front teeth are not installed according to the neutral zone;

c) Simulation basis with vestibular side too long.

It is known that the fixation of full dentures for toothless jaws improves to 7 days to use them, reaching its peak at 1 month and kept for a year and then gradually begins to deteriorate. The same results are obtained and chewing efficiency of dentures. The degree of stabilization dentures for toothless jaws is also advisable to evaluate only after some time of use. The stability of the prosthesis in dynamic is checked at runtime given patient movements. The prosthesis also should not move during voluntary movements of the mandible.

The objective and subjective evaluation tests were offered to complete a comprehensive assessment of denture.

Rules for the proper use and care of dentures

After the imposition of dentures for foundation area next visit for a patient administered the next day, then the correction is carried out once in three days, then - once a week. This place is determined pain plaster powder or powder dentin for bandages. Intended place to carry the prosthesis, corrected and polished.

The patient acquaint with the rules of dentures:

- after each eating dentures should be removed from the mouth and rinse with water mouth wash;

- remove dentures at night, carefully brushing with soap or tooth powder and store in a sealed box that easily disinfect.

The term of use of dentures (average) is 3-4 years. After 3 years of chewing efficiency is high enough, but significantly increases the time chewing food compared with the data at the end of the first year of use. 3-4 years balance increases and worsens fixation of the prosthesis as a result - jaw atrophy and lack of compliance with foundation area base prosthesis. Cutting edges and chewy cusps artificial plastic teeth erased and reduced height lower part of the face. Such patients must fabricate new dentures. If the patient's teeth with porcelain prosthesis, eliminate balancing and functional recovery suction is achieved by rebasing of dentures, better laboratory methods.

The sensitivity of the soft palate to irritation is manifested very often by a vomiting reflex, which is a defensive reaction of the body. Vomiting reflex is caused by irritation of the nerve endings located in the mucous membrane of the soft palate, root of the tongue, pharynx. It can also be

considered a symptom of functional disorders of the central nervous system, organic diseases or worm infestation. In these cases, the underlying disease should be treated.

The irritant that causes a conditioned reflex with nausea, vomiting, may be poorly made prosthesis of the upper jaw. The prolonged action of the stimulus leads to the fixation of pathological vomiting reflex.

In the manufacture of complete dentures on the upper jaw, quality should be considered as only one mark that cannot get any vomit reflexes. Where this is not possible, on the impression shown foundation area tissues in the down position, the muscles of the soft palate and dentures made for such reflection will not be enough to fit snugly foundation area. To get quality impressions must strictly follow the rules receipt impressions.

This patient's head is firmly fixed in the headrest upright. Great importance psychotherapeutic training the patient, explain the safety of manipulation, repeated administration impression tray in the mouth. In severe cases, it is desirable to make basic plate and every day you use it to increase from several minutes to a day.

Impression materials should be used in minimal quantities (for weakening irritating action), when receiving an impression material initially vigorously and firmly pressed against the mucous membrane of the distal foundation area. Carefully selected impression tray introduced quickly, trying not to touch the back of the tongue, because this sickness increases.

In addition, if the imprint cannot be obtained without causing a vomiting reflex, the distal palate should be treated with a dicaine solution.

Increased vomit reflex in patients who use dentures may occur for gapping in the distal or distal edge of the distal extended by insufficient insulation torus, uneven closure of the alignments absence of tight contact lateral teeth.

Clinical observations show that the denser adjacent to the prosthesis mucosal foundation area, the weaker vomit reflex.

Decrease the vomit reflex dentures modelling accordance with the following requirements:

- distal end of the prosthesis should be as thin as possible and gradually move into the anterior;
- chewing teeth should be located at the edges of the tongue, so that they hung over his back;
- if there is a large hypertrophied tongue, dental arches should be wide enough and located under the neutral zone.

The issue of adaptation

Prosthetic treatment is a serious interference with the human body. Adaptation in prosthetic dentistry understand how addictive the patient to the prosthesis, as well as prosthetic devices to tissue foundation area at rest and during mastication (N.V. Kalinina, V.A. Zahorskyi, 1990).

Most authors agree that adjusting to dentures causes psychological difficulties and vegetative vascular reactions, irritating implant as a foreign

object in the mouth (V.Yu. Kurliandskui, 1939.1955; I.T. Miroshnychenko, 1971, 1972, V.N. Trezubov, 1988; H.B. Shylova 1967).

For the first time, the problem of adaptation unties V.Yu. Kurliadskym (1939-1969) of the academic teaching positions I. P. Pavlova. Habituation to dentures develops due to the development of cortical inhibition, which led to the disappearance of foreign body sensation. It was noted that the inhibition denture bearing is developed on the basis of universal law, according to which any stimulus for extended its use becomes a stopping agent for the mandatory participation of the cerebral cortex.

Therefore, V. Yu. Kurliandskyi identified in the addiction to certain prosthetic phase. The first phase is the phase of stimulation (the day of imposition of the prosthesis) when attention is fixed on the patient's teeth preparation or prosthesis as the foreign object. Denture irritates the nerve endings of the oral mucosa. Irritation receptor reflex arc transferred to centres salivation, speech and so on. As a result, enhanced salivation, urges to vomit, broken articulation, chewing and swallowing are observed.

The second phase is the phase partial inhibition (1-5 days after the imposition of the prosthesis) when salivation, diction, soft tissue tension normalises, restored chewing capacity fading vomit reflex.

The third phase is the complete inhibition (5 to 33 days) when the patient does not feel the denture as a foreign object. Functional maximum power is restored.

Accessories patient for prosthetic I. S. Rubynov (1958-1972) considered because of objective methods (masticography), concluding that the basis for adjusting to the emergence of new dentures is conditioned the motor reflexes are improved and secured.

The next step in elucidating the mechanisms of addiction to the dentures can be considered a work H.B. Shylova (1960-1973), which proved that this present not only relative, but conditional, unconditional neural connections. It showed that the denture as a foreign body irritates the sensory receptors foundation area and in response to a prolonged stimulation of protective inhibition occurs unconditional and not contingent cortex. According to the author, restore chewing function depends on the formation of a new dynamic movement patterns. That is, in addition to the dentures can be divided into two stages: the development of protective inhibition in adapting to implant as a foreign object and forming a dynamic stereotype motor act of eating based on conditional unconditional nerve connections.

Interesting ideas about adaptation to dentures were proposed by D.A. Kalvelys (1961), who considered the morphological, chemical and functional changes that occur under the influence of dentures, partial biomorphosis, that is, the response of tissues to the irritant.

With partial biomorphosis, the dentures are mechanical dentures. The response of the organism in response (tissue transformation) is a biological process. Irritants in partial biomorphosis have specific features and their limits of action. To a certain extent, they act as stimulants and cause corresponding changes in the tissues. If these limits are exceeded, the

individual is injured and mobilizes their defences. According to the author of this theory, the goal of the orthopedic doctor is to be able to create an adequate stimulus in each case and thus to cause the response of the organism in the form of an appropriate biomorphological adjustment.

I.T. Miroshnychenko (1972) studied the functional characteristics of chewing muscles in the process of adaptation to complete dentures. He proved that during the adaptation to the prosthesis, a new dynamic stereotype chewing in which chewing muscles begin to work on a new physiological level.

Analyzing the compensatory-adaptive restructuring in prosthetic masticatory apparatus against the background of complete lack of teeth according electromyographic study S.I. Kryshtab and A.I. Dovbenko (1983) defined the terms of adaptation and their dependence on the length of the previous period no teeth. They have shown that adaptation is optimal when prosthetics are performed in the first 3 months after tooth loss, ie before the formation of a "pathological" stereotype of chewing.

Studying regularities of adaptation to different orthopedic structures, the authors note that there are no significant differences in the duration of adaptation in persons of different age groups (V.D. Sinitsyn, I.V. Hunenkova, 1987). At the same time, it is pointed out that the signs of irritation in the first days of denture use are less noticeable in the presence of permanent dentures and in persons who have been re-implanted with removable dentures (V.D. Synytsyn, I.V. Hunenkova, 1989).

An important aspect of adaptation is the restoration of articulation while using dentures. Evaluating it from the standpoint of conditioned-reflex activity, it should be noted that speech adaptation is the result of the interaction of the active organs of speech articulation with prostheses (K. Rutkovskyi, 1970).

Prominent psychological adaptation was diverted by S. Popov and S Staykov (1965) V. Zhelezkov (1965), B. Bergman and Sarlsson G. (1985).

N.Yu. Neznanova (1989) draws attention to the fact that the course of adaptation to removable dentures depends on the mental state of a person proves that not only the structural features of the prosthesis, but also psychosomatic disorders, can cause the violation of addiction to removable dentures.

E. Deichsel (1982) believes that the main reason that helps improve addiction to denture is patient satisfaction prosthesis. Positive emotions associated with the restoration of teeth, improving the appearance of the face because of a successful prosthesis. On the contrary, bias can play a negative role in the process of adaptation in the formation of new or restoring lost conditioned reflexes.

Therefore, summing up the views on this issue, and N.V. Kalinina V.A. Zahorskyi (1990) define psychological adaptation as a sum of complex conditioned reflex reaction of the patient, within the scope of human emotions and determine patient satisfaction with dentures.

M.Ya. Nidzelskyi (2003) conducted an analogy between the general adaptation syndrome (stress) and the development of adaptation to dentures. He has established a guiding role peroxidation and excessive development of secondary pathological processes in patients who have become accustomed to full dentures or use them. The author showed that at the beginning of the prosthesis could predict heavier course of adaptation to complete dentures for patients with "troubled" or "disturbing" behaviour that is "unstable" to stress people. Also expediency prosthesis in summer and autumn when sufficient supply of the body increases stress biooxidants body are noted.

Extension ideas determine the mechanisms of adaptation to complete dentures a prerequisite for effective management of the adaptation process. There are ways to resolve this issue as psychological assistance and pharma correction. The latter can be local when used anesthetic drugs, adhesive gels and other products that weaken irritating to tissue of the foundation area. Pharmacocorrection also justified at the whole body, including through adaptogens (Lev V, 1999) or nootropics (T. Deviatkina et al., 2001).

The problem of rehabilitation of patients with complete loss of teeth is extremely urgent because the efficiency of prosthetic treatment depends not only on the technology of making dentures and functioning and quality organs maxillofacial area in conjunction with prosthetic structures (I.Yu. Lebedenko, E.S. Kalivradzhyian, T.I. Ibrahimova, 2005).

No less significant factor is the restoration of occlusion, which has its features. Dentures full dentures require so-called "balanced occlusion" that prevents displacement of the denture base when and non-functional functional loads (Hayakawa 1, Hirano S, Takahashi Y et al., 2000). However, premature contacts for closing the artificial dentition create multiple barrier s to their occlusal contact surfaces (Muruta N, Tagucl1i N, Hatada T, 2002; Paton G. et al., 2002).

With for adaptation to complete dentures as a "body" doctor must explain the patient recovers as a function of speech is necessary for proper chewing and how to behave in the event of unusual, sometimes even painful feelings under the base of the prosthesis (E. Iofe, 1999, P. Khel, 2001; B.I. Korzh, 2002).

Modern methods of quality assessment made full dentures imperfect (N.V. Kalinina, V.A. Zahorskyi, 1990). Complete dentures assessed visually focusing on the subjective feelings of the patient.

Therefore, methods for evaluating the quality of manufacturing complete dentures authentic. However, the tests are objective and subjective criteria to assess the quality of manufacturing partial dentures (A.G. Zaitsev, 1992) and maxillofacial prosthetic upper jaw (O.B. Bielikov, 2003).

Given the difficulty of objectively assessing the quality of complete dentures made and lack of data in the literature, we developed are special tests, based on an objective assessment of subjective i partial dentures (A.G. Zaitsev, 1992), maxillofacial dentures (O.B. Bielikov, 2003).

However, the authors proposed tests "BOCA" and "BOFOSAU" for full assessment removable dentures not completely confront to our task.

These tests were not taken into account the following criteria of the most important: the "Boca" - made dentures stabilization (A.G. Zaitsev, 1992); in "BOFOSAU" - degree of fixation density i fit removable complete denture to the mucosa foundation area, denture base specification compliance palate relief, the degree of overlap piece teeth etc. (O.B. Bielikov, 2003).

We have adjusted the settings to the full criteria of removable dentures and developed objective and subjective criteria for their evaluation with correction adaptation processes that formed the test "BOFSAS".

Evaluation of "BOFSAS" criteria test

B - overlapping base prosthesis for foundation area (free or difficulty), determine the status of the base, its technical performance, thickness, colours, clarity polishing, precision fit to the mucosa (determined by visual inspection and by medical probe);

O - type occlusion, degree of closure teeth with artificial teeth, opposite (dense presence of cracks, the state of artificial teeth, the correct definition of the relation of the central jaws (overstated or understated height of bite), the density of sliding contact at various sides of the teeth, tilt the slopes compliance lateral teeth the transition from the lateral occlusion of the central character i value overlap frontal property;

F - degree of fixation (perfect, good, satisfactory, the absence of fixation) denture removed from the breach of the locking valve or without;

S - stabilization, the degree of normalization of speech, chewing and swallowing, the degree of stability at function;

A - adaptation of complete dentures evaluated by subjective patient data (the functional parameters: eating any consistency in adapting (or accelerated) for the first time or re making denture of patient, pain, requiring correction or not (Naumov criteria);

S - satisfaction or dissatisfaction manufactured prosthesis (visually fixation during use, aesthetic satisfaction, while of communicating, eating food, the presence or absence of pain while using prosthesis).

Dentures are made under the proposed test is evaluated by two parameters: "satisfactory," "unsatisfactory".

The "satisfactory" corresponding to the following criteria:

B - free and painless overlay prosthesis for foundation area, snug fit exact i denture base to mucosal foundation area, the margins of foundation area, matching macro - and micro arch it ectonics relief mucous, thick base - 2,0-2.5 mm, most -3.0 mm, Basis polished carefully, without defects treatment and polymerization (not far), no residual gypsum gum edge prosthesis modelled according to these gums;

O - relation central fixed jaw properly, setting artificial teeth of in tight contact teeth-antagonists, availability three-point contact in front occlusion, occlusion in the presence side contact heteronymous cusps on the balancing side and the same name - on your character and value overlap frontal relation corresponding to property jaws;

F - correct choice of the design of complete dentures, his tight fit to the mucous membrane to the alveolar bone (when using alveolar clasps) to

the palate, matching borders prosthesis availability for bridles and buccal-alveolar folds degree of fixation;

C - stabilization prosthesis, dentures firmly fixed on foundation area, no balance transfer and denture during chewing i speech, swallowing chewing and free, painless;

A - free food use; when using the prosthesis to the patient conducted from 1 to 3 corrections, getting used to the prosthesis lasts 24-30 days;

S - patient prosthesis satisfied completely stable prosthesis during chewing, phonetic and eliminate cosmetic defects eating any consistency does not cause difficulties, chewing painless.

Deviations from at least one criterion considered "unsatisfactory" and requires the production of a new prosthesis.

Consequently, the proposed test to predict the results of prosthetic treatment makes significant adjustments to the process of adaptation to complete dentures.

FUNCTIONAL ASSESSMENT OF THE QUALITY OF COMPLETE REMOVABLE DENTURES

A number of subjective feelings and objective assessment made designs determines quality full removable dentures prosthesis.

Subjective assessment of the quality of prosthetics

In terms of clinical patients receiving a complete lack of dental prosthetics assessing the quality significantly, help subjectively objective tests, which ultimately is to establish patient satisfaction results of treatment.

Objective evaluation of the quality of prosthetics patients with complete absence of teeth.

In terms of comprehensive scientific research, especially in cases improvement or application of new technologies, methods for assessing subjective quality prosthesis are not enough. On this basis, we are using electromyography studied the degree of restoration of chewing function in patients with complete loss of teeth in different periods prosthetic treatment.

For the initial data and subsequent comparison of parameters of bioelectrical activity took control group of people aged 23 to 35 years. Chewing apparatus intact, no pathological changes in periodontal and oral mucosa allowed us to use their data as normal.

During the functional test that included wilful maximum compression jaws revealed rounder emergence of high-oscillations and their gradual extinction by the end of the sample and with the same rounder transition from an active state to rest. In a state of relative calm mandible bioelectric activity not recorded and presented isometric line.

Sample "chewing arbitrary" characterized by fragmentation patterns electromyogram, clear alternating bursts of activity with periods of rest. Bioelectric activity differs sufficiently high amplitude at the beginning of chewing to lower it to the end, as soft food stimulus. Electromyographic normal functional status of masticatory muscles both graphically illustrated in Fig. 81, 82.

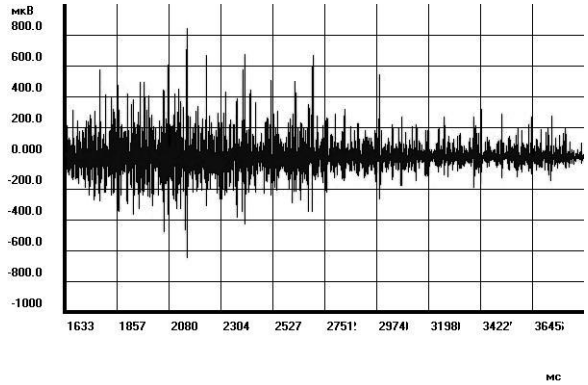


Fig. 81. Electromyogram of intact dentition, functional test "wilful lockjaw" (right masticatory muscle)

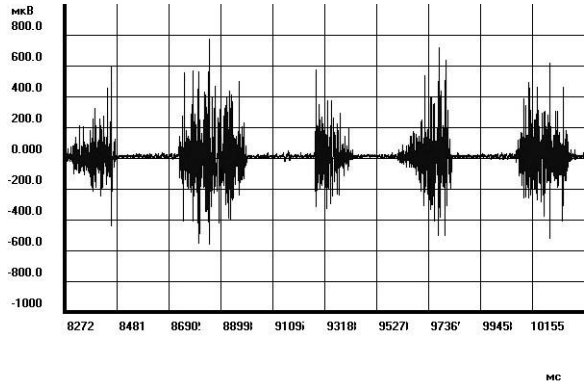


Fig. 82. Electromyogram of intact dentition, functional test "arbitrary chewing" (right masticatory muscle)

Comparative evaluation of functional chewing muscles on the stages of treatment of patients with complete absence of teeth

Loss of teeth leads to persistent violations coordination mechanisms act of chewing, which affects the nature of the excitatory and inhibitory processes in the chewing muscles. Prosthetic treatment that involves the production of full dentures both jaws activates conditional unconditional food reflexes and motor stereotype forms of chewing, the relevant any conditions in the mouth. The adaptation to the prosthesis rather long and its end can be judged by persistent effect in functional activity of masticatory muscles and their performance bioelectrical activity indirectly, to assess the quality of prosthetics.

We analysed the function of masticatory muscles during chewing without dentures. However, to assess bioenergy record was only after their qualitative characteristics, namely:

- in a state of relative calm mandible electrical activity is not registered and electromyogram looks isometric line. Functional test "maximal volitional contraction for three" different subjective discomfort in the temporomandibular joint and the nature of the activity is uneven in strength and number of motor ridges involved in generating bioenergy. Their amplitude varies from 50 to 87 μV. High fluctuations vary quite low during recording, the transition from an active state to an unstable peace, smoothed. In electromyogram clearly determined usual chewing side. All this illustrates the following entry (Fig. 83).

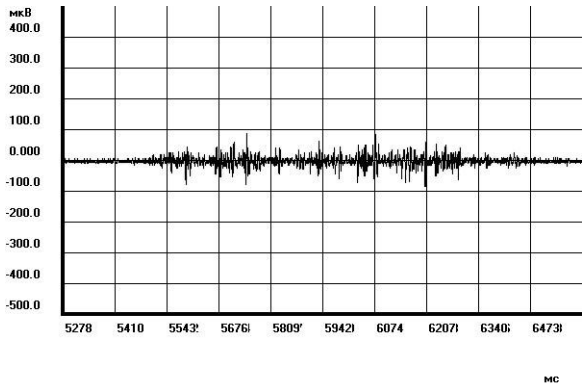


Fig. 83. Electromyogram L. patient for maximal volitional contraction toothless jaws (without prosthesis) right masticatory muscle

Functional test of "arbitrary chewing" without dentures is made the subject only qualitative analysis (Fig. 84). Records disorganised and have the appearance of one process activity periods without braking chewing muscles on both sides. The whole structure is represented by the alternation of high-low and (to 100-110 μV) oscillations that occur simultaneously in the muscles of both sides, but expressed only in the conventional side.

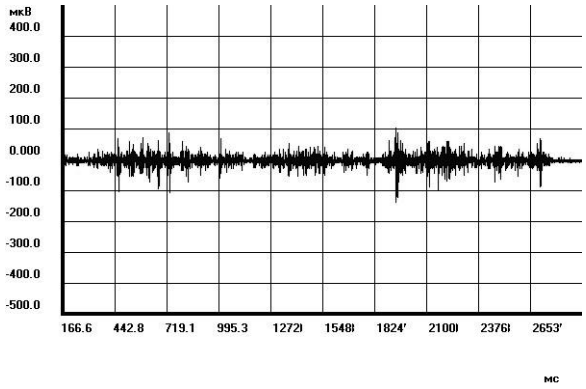


Fig. 84. Electromyogram L. patient at random without chewing dentures, right masticatory muscle

Provisional figures for those not subject electromyogram analysis. The first reference work records the bioelectric activity performed on the day we made the imposition of complete dentures in almost all patients. In comparative aspect of interest were several electromyogram obtained during the execution of the proposed trial dentures, made earlier.

The recording quality execution of functional tests "volitional contraction" old and new dentures graphically illustrated in Fig. 85, 86.

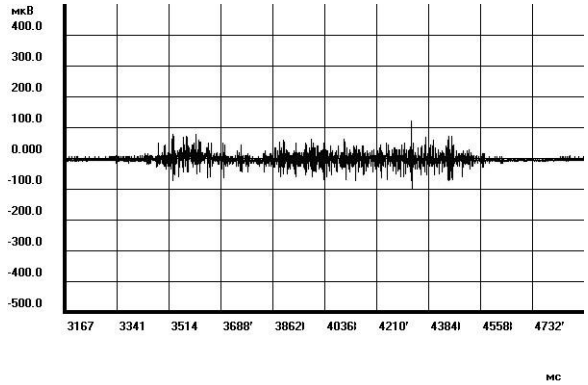


Fig. 85. B. electromyogram patient during the performance of "volitional contraction" old jaws removable dentures (right masticatory muscle)

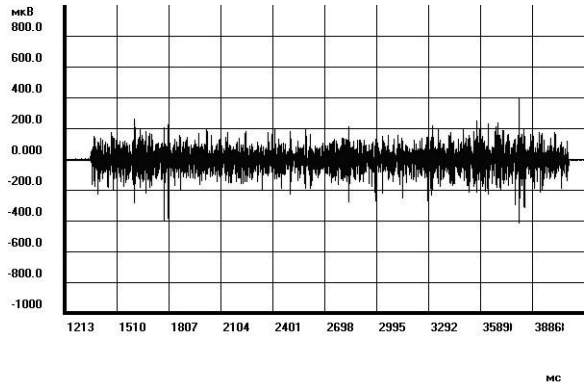


Fig. 86. B. electromyogram patient during the performance of "volitional contraction" with new prosthetic jaw (right masticatory muscle)

As for the quality analysis electromyogram should be noted that dissatisfaction with the old dentures likely justified. The record is uneven, different variations low-amplitude (only a few bursts reach the mark of 100 μV). Preliminary phase stretched, motor ridges included in the process of reducing "cautiously."

During the compression jaws with new dentures, in contrast, stands out immediate inclusion of many motor ridges in the structure of all records within the sample evenly character. The amplitudes of the oscillations bioenergy generally are grouped in the same range (up to 200 μV isolated bursts of up to 400 μV).

More qualitative differences can be found in the arbitrary execution of mastication (Fig. 87, 88).

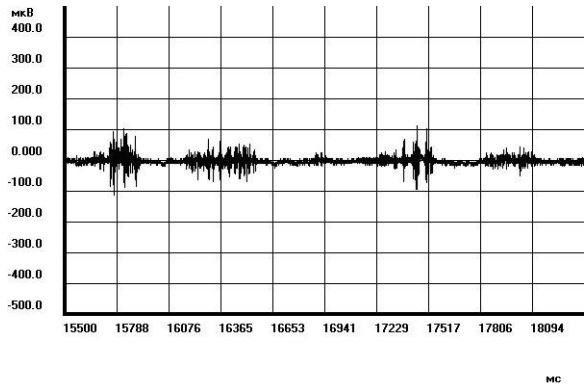


Fig. 87.Electromyogram patient during random old chewing complete removable dentures (right masticatory muscle)

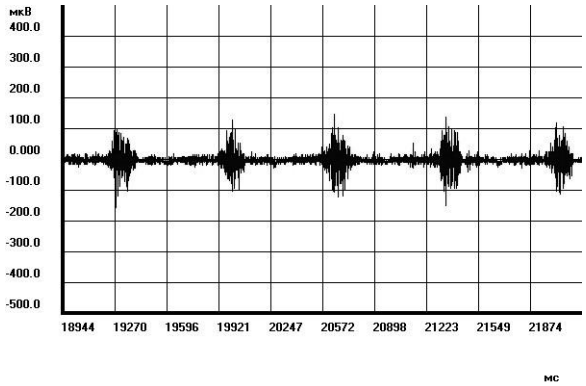


Fig. 88. Electromyogram patient during the execution of arbitrary new dentures chewing (right masticatory muscle)

Comparing electromyogram character, it must be emphasized expressed varying degrees of ruggedness structure. In the records of high-volleys well marked activity alternating with periods of relative calm bioelectrical. But in the case of chewing old dentures shots do not look "formed" and different deposition potentials in the middle of some volleys. Contrary to the old new dentures allow rational use of muscle energy processes of inhibition expressed clearly. Consequently, using qualitative analysis electromyogram does not detect a significant difference in the records given the nature of the studied situations.

In summary, we note that along with significant violations of the functional state of masticatory muscles in patients with complete loss of teeth already imposing dentures day observed some progress in normalizing the act of chewing.

The functional status of masticatory muscles in the process of adaptation to complete dentures

An indication of completion of the adaptation process, and thus the quality of manufacturing complete dentures are data electromyographic studies a month after the prosthesis.

The absence of subjective complaints on the quality of prosthetics, dentures confirm the successful use of indicators of masticatory muscles.

Thus, in analysing the functional test records "maximal volitional contraction jaws" draws attention not only to higher amplitude biopotentials (500 μV) and evenly and saturated fill the entire sample. As with normal activity it is accompanied by a simultaneous reduction in the process of inclusion of many motor ridges. Here electromyogram month after prosthetic previously provided in the control group (Fig. 89, 90).

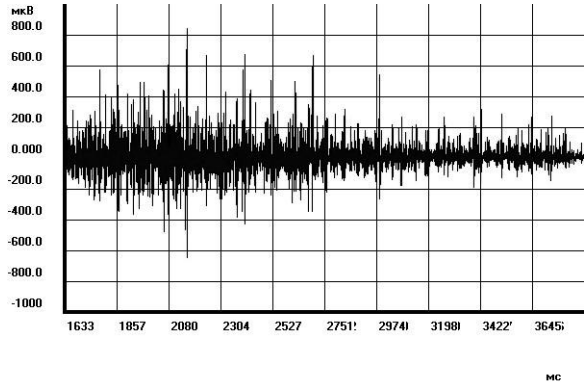


Fig. 89. Research electromyogram volitional contraction of the jaw intact tooth rows (right masticatory muscle)

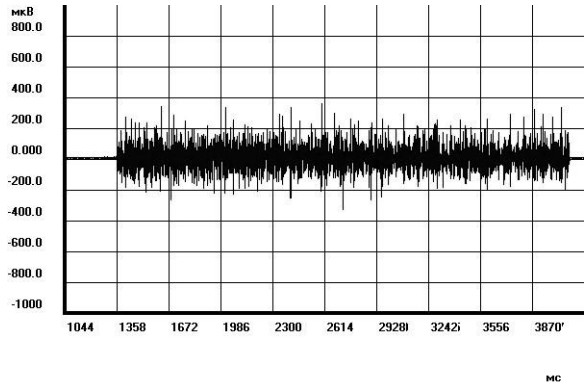


Fig. 90. Electromyogram patient at volitional contraction of the jaws of complete removable dentures after a month of use (right masticatory muscle)

Equally revealing a tendency to normalize the act of chewing characteristic the functional test of "arbitrary chewing" is performed. Records are characterized by a pronounced fragmentation patterns, good uniform "saturation" bursts of activity, many potential fluctuations (up to 400 μV). The next electromyogram defined working and balancing sides, but in one area clearly seen alternating sides of chewing, which is most notable element of the arbitrary recording chewing in patients with intact tooth rows (Fig. 91, 92).

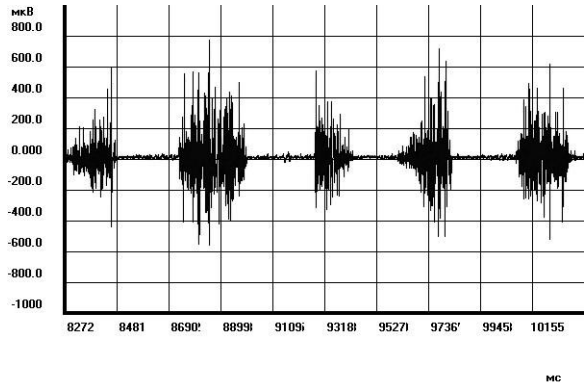


Fig. 91. Research electromyogram. Arbitrary normal chewing (right masticatory muscle)

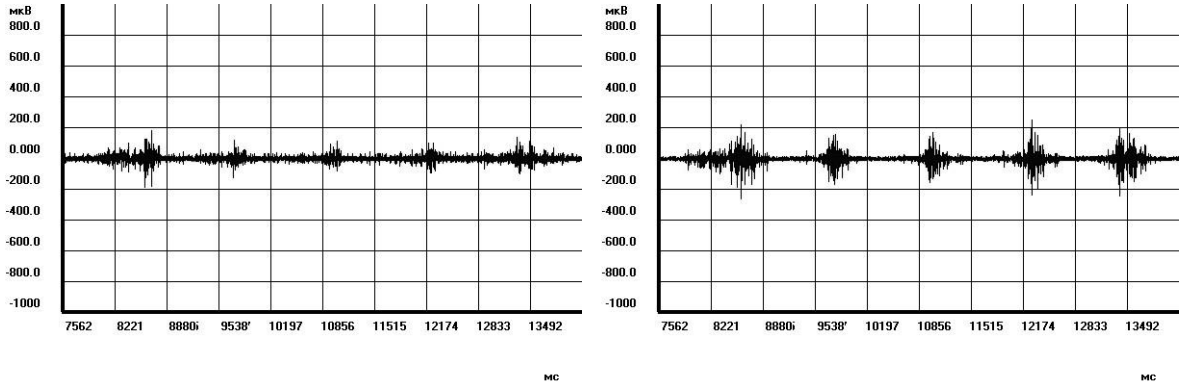


Fig. 92. Electromyographic. Arbitrary chewing a month after the prosthesis (left and right masticatory muscles)

Thus, the qualitative characteristics electromyogram indicates a pronounced tendency to normalize the act of chewing and complete the process of adapting a month using dentures subject to quality manufacturing. Long-term results of prosthetics tested a year using dentures. The decisive criterion for assessing the quality and nature of prosthetics adaptation process is patient satisfaction made structures.

Good fixation and stabilization of dentures, restore chewing function, eliminating defects phonetic suggest the formation of new functional dentition, creating a stable stereotype chewing.

Objective evaluation of the quality electromyographic confirmed prosthetics feasibility subjective tests. In qualitative analysis, items are clearly divided structure, alternating bursts of activity with periods of rest, relatively high amplitude bioenergy.

When comparing electromyogram that is received during this period with recorded earlier in people with intact masticatory apparatus stands strong trend towards normalization. As an illustration the electromyographic present is written observations in dynamic (Fig. 93-95).

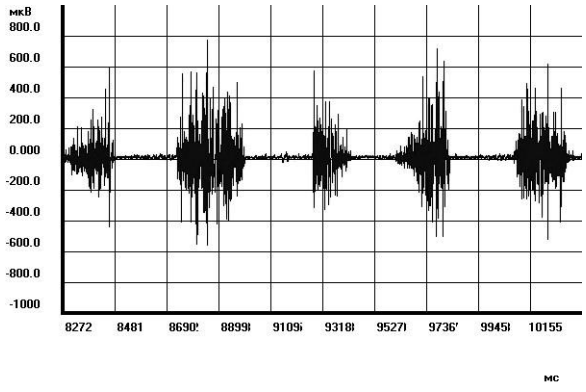


Fig. 93. Electromyogram Research, functional test "arbitrary chewing intact tooth rows" (right masticatory muscle)

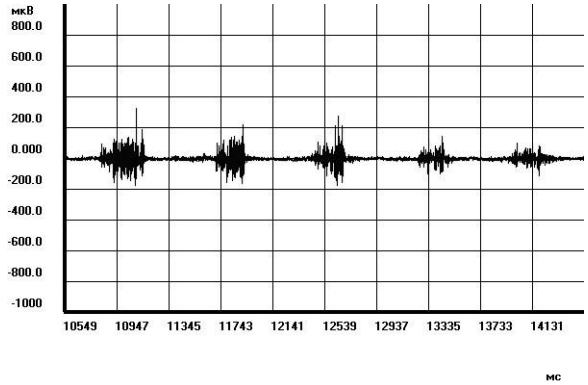


Fig. 94. B-electromyogram patient at. Arbitrary chewing a month after the prosthesis (right masticatory muscle)

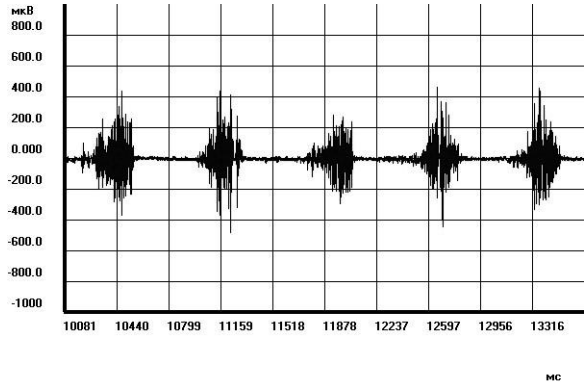


Fig. 95. B-electromyogram patient at. Arbitrary chewing a year after prosthesis (right masticatory muscle)

The shortcomings of dentures in the first days of their use, which often have errors medical and technical use have been removed and are not reflected in the result.

So, electromyographic studies of the nature of chewing function recovery seen strong trend towards normalization. It is to increase the amplitude of bioenergy in terms of the date of imposition of the prosthesis, 1 month and 1 year after prosthesis (from 350 to 500 and 560 μV).

In addition, characteristic feature complete regulation of muscle activity is dissected structure recordings that alternating bursts of activity with periods of rest, and change sides reflex chewing during one period. The most notable was the relation of excitatory and inhibitory processes – factor "K".

The data confirm the adequacy objectively assess the quality of prosthetics using subjective tests used in mass fabrication.

Always carefully study the weaknesses identified during its review of the wax model design and the finished prosthesis. It can determine the cause of errors, repeated, and outline ways to address them. After the imposition of complete denture patient is under medical supervision for a sufficient time in order to make sure that he got used to the prosthesis, uses it constantly, and foundation area tissues are in good condition.

Part VII

SHORT- AND LONG-TERM RESULTS OF PROSTHETICS WITH COMPLETE REMOVABLE DENTURES. HARMFUL EFFECTS ON THE DENTURE FOUNDATION. METHODS OF DIAGNOSTICS. PREVENTION

The study of immediate and long-term results prosthesis includes not only assesses the quality of dentures and their functional properties, and detailed study of tissue reactions and dentition, denture that operates directly or indirectly. Impact of prosthesis in tissues and organs dentition varied as reactions in response.

First, it should be borne in mind that the prosthesis can act on tissues and organs of the oral cavity directly. This action occurs during contact with the tissues of the prosthesis, which are to combine the term "foundation area." Foundation area is hard palate mucosa, alveolar ridges.

The prosthesis has also indirectly removed from his organs and tissues through various organs and systems. The consequences of this action are changes in muscle function, joint with a decrease or increase occlusal vertical dimension; periodontal degeneration in the functional overload abutment teeth and so on. Thus, the effect is not limited to prosthetic foundation area, but goes far beyond it.

We came to the need to disclose the contents of another term - "prosthetic field." He called all the tissues and organs that are in the area as the indirect and direct action of the prosthesis. Foundation area in this sense is part of the prosthetic field.

In response the foundation area determined on the one hand, the nature, intensity and duration of the stimulus, and the other - reactivity. Today we cannot talk determination the impact on the prosthesis foundation area tissue without specifying a connection between a specific stimulus and response. The study of the aetiology and pathogenesis reactions foundation area tissues can detect changes due to clinical, technical performance of various procedures during the prosthesis due to the nature of the material from which made prosthesis, or the principle of the design. Data obtained in this case, can prevent a number of changes, in other words, helping to plan prevention.

First, it is important to find out what the nature of the stimuli that creates prosthesis and what its properties are related. We consider it appropriate to highlight the adverse, toxic, allergic and traumatic action prosthesis.

Side effect denture is to transfer chewing pressure on the tissue foundation area that is inadequate irritant to the mucous membrane in initiating self-cleaning, thermoregulation, speech, perception of taste in a functional overload of periodontal supporting teeth clamp systems, etc. Adverse effects of denture should be considered a "greenhouse effect" and vacuum.

"Greenhouse effect" occurs when you use dentures with a plastic base that has low thermal conductivity. As a result, when the prosthesis is stored in temperature close to the temperature of the human body. It promotes the

reproduction of microorganisms and hygienic condition worsens foundation area, hinders heat in the mouth.

Vacuum occurs when the prosthesis with good locking valve. Because of this, there is an effect Medical (bloodsuckers) banks, accompanied by hyperaemia of the mucous membrane of foundation area and chronic inflammation. In the pathogenesis of this symptom, important role played by the state capillaries, in particular their permeability, which varies with many common diseases of the body.

It may be noted that side effects resulting from the principle of the prosthetic construction. Changing the type of prosthesis can ease side effects, but eliminate it impossible. You can, for example, reduce the harmful effect of denture base to the mucous membrane by replacing plate arc prosthesis, but completely avoid action basis prosthesis fails. You can reduce the functional overload, but to eliminate it as impossible.

Toxic effects denture caused by excess monomer, which as air irritates the mucous membrane foundation area and bacterial toxins in poor hygiene prosthesis.

Allergic action of the prosthesis is caused by the materials from which it is made. Monomer and colours that make up the base of the prosthesis, and metal oxides reacting with proteins foundation area tissues become allergens. As toxic and allergic effects, prosthesis can be eliminated by the selection of appropriate base materials and alloys.

Mechanical injury caused by denture base. This happens whenever the prosthesis margins do not correspond to the form and margins of foundation area.

The following gradation of stimuli does not cover the whole range of indirect and direct action of the prosthesis. Between these stimuli and does not always an accurate face.

Reaction of foundation area tissues

So far, the main structural material for bases dentures is acrylic plastic row. According to L.D. Chulak (1997), of which produce 98% of all removable structures.

The reaction to the prosthesis depends on a number of factors that cause certain complications. They are:

- diffusion of low molecular substances that make up the plastic prosthesis (organic and inorganic components free monomer);
- allergic prosthetic material effect on the patient;
- infringement of heat exchange processes during denture base;
- the effect of metabolic products of microorganisms penetrate the material of the prosthesis;
- factors influence the surface (inner surface irregularities prosthesis availability performances pores of different sizes and etc.).
- psychogenic factors.

Complications that arise when using removable dentures from acrylic plastic, classified in the literature as a syndrome of "intolerance acrylic plastic." However, this term does not reflect or etiologic or pathogenic nature of the disease. In addition to these titles in the literature using the terms "prosthetic stomatitis",

"allergic stomatitis", "intolerance dentures", "contact allergy", "acrylic stomatitis" (Nikolishyn A. K, Nikolishyna E. V, 2002). Of the currently known most commonly used classification described in the writings Z. S. Vasylenko and A. K. Yordanyshvyly.

Based on clinical features, pathologic pattern data of clinical and laboratory studies of diseases of the oral mucosa Z. S. Vasylenko provides 3 groups:

-inflammation (stomatitis);

-non inflammation (receptor system dysfunction);

-combined form.

Inflammatory disease may be acute and chronic in nature and are divided into two groups: the focal localized (traumatic aetiology), diffuse (toxic - allergic aetiology).

Dysfunction receptor system associated with the use of removable dentures can be divided into primary (primary lesion of the mucous membrane receptors) and secondary (associated with the presence of disease in the central nervous system or internal organs).

Joining the disease is difficult to diagnose and are characterized by both inflammation and productive changes in mucosal foundation area and receptor system dysfunction.

In the classification by Yordanyshvyly such forms marked lesions of oral mucosa:

- by aetiology: traumatic, toxic, allergic, caused by physical factors;
- by pathomorphological nature of the process: catarrhal, erosive, ulcerative, necrotic, hyperplastic;
- the nature of the course: acute, chronic, exacerbation of chronic;
- localization lesions: focal, diffuse, combined.

In studying of the reaction of foundation area tissues primarily attracts inflammation of the mucous membranes. Various hyperplastic epithelial proliferation and even polyps probably occur again. Inflammation caused by dentures, prosthetic many authors called stomatitis. This term reflects the basic content of the reaction foundation area - inflammation and its cause - the prosthesis.

In addition to inflammation, there are varying degrees of depth and mucosal damage - from palatal excoriation to deep pressure sores (decubitus ulcers). Decubitus ulcers and stomatitis assumed.

Phenomena hyperesthesia mucosa in patients who use dentures, perhaps, should be considered separately from stomatitis, because their nature is different and still not understood.

Focal inflammation may occur against the background of both normal and atrophic mucosa. It appears as a point congestion, and sometimes - large hyperaemic spots on the mucosa of the hard palate or alveolar part of the upper and lower jaws simultaneously or only the upper or only the lower jaw. In the back third of the hard palatethere is an inflammation, moreover, swollen and rough due to loosening of the epithelium. Some of them have all the signs of catarrhal inflammation, the other against the backdrop of swollen epithelium observed

erosion, hyperplasia proliferation as small mushroom and villous polyps. Sometimes proliferation of epithelial resembles fine granulation. In the inflamed mucosa may pinpoint haemorrhages.

Inflammation can be single and multiple. Set any pattern in their size and topography impossible.

Diffuse inflammation of the mucous membrane foundation area is characterized by the same features, but as opposed to focal occupies the entire space of foundation area, exactly coinciding with the outside.

Foundation area of cherry-red, often swollen, loosened. In the same patient may experience areas catarrhal inflammation of the mucous membrane and areas with violation of integrity of the epithelium as erosions or polypus growths. Sometimes the inflammation goes to the mucous membrane of the cheeks and lips. In this case, should be suspected allergic (toxic) nature of inflammation. Inflammation of the mucous membrane foundation area may be accompanied by hypersensitivity, making it difficult to establish its cause.

The causes of focal inflammation of the mucosa of the hard palate, alveolar processes are violations of articulation artificial dental arches; base balance, guiding to uneven distribution of pressure on the prosthetic box; and the roughness of pores in the base of the prosthesis; breach of oral hygiene (poor care of dentures); excess monomer in the violation of the polymerization.

In addition to these causes that can be eliminated, a factor that causes tissue changes foundation area is a side effect of prosthesis, including unusual pressures dentures convey the mucous membrane through its base. These changes cover all foundation area tissue (epithelium, connective tissue and bone periosteum). Research (M. A. Rebrova, R. Sh. Shaymerdenova, K. D. Dushaylyev) showed that the mucous membrane foundation area meets the first defensive reaction in the form of a thickening of the epithelial sheet, which changes the phenomena of atrophy, accompanied by thinning of the stratum corneum. This is clearly manifested in people who use dentures for 5 years. Further stratum corneum disappears and following it appears granular layer.

It is established also that approximately 3 years from the start of the use of dentures develop chronic inflammation of mucosal layer itself. Chronic aseptic inflammation of connective tissue in the form of infiltration round cell eventually expands capturing epithelium. Therefore, people who use dentures for a long time, inflammation of the epithelium may have different origins. On the one hand, its drawbacks are the reason prosthesis on the other - there is inflammation in the submucosal layer of connective tissue and is the result of a side effect of the prosthesis.

Along with inflammation, changes in vascular foundation area tissues as thickening of their walls, fibroelastose explicit and sometimes focal endothelial proliferation. There are also reactive changes of nerve guides. They are expressed in varicose thickening, fragmentation and disintegration of granular pulpous nerve fibres and granular disintegrationnon-mild.

Revealed some changes in the periosteum. Initially, it thickens due to the proliferation of osteoblasts, then compacted, then turns into a thick fibrous cord.

Over a longer period of dentures the haemorrhagic infiltrates are formed formed. In foundation area the tissues is affected by inflammation, altered content and distribution of glycogen, mucopolysaccharides, ribonucleoproteins and phosphatases. Based on structural and functional changes in tissues of foundation area is especially poor circulation caused by the direct action of chewing pressure is transmitted through the base plate removable prosthesis.

It is revealed a pattern between the terms of use dentures and reactive changes. The more time passed since the imposition of the prosthesis, the more pronounced changes. Structural and functional changes in the foundation area tissues eventually lead to changes in vertical compliance mucosal foundation area. Studies have shown V. I. Kulazhenko, point yielding mucosal foundation area decreases with increasing duration of use dentures.

Traumatic prosthetic stomatitis. For non-base implant surface margins and foundation area having traumatic stomatitis. Often they are on the verge of foundation area and is the cause of their injury margin basis. The clinical picture may be varied. With specific complaints with traumatic prosthetic stomatitis often refer pain at the site of injury, which is enhanced by the use of prosthesis. Usually this form of elongated at caused minor injuries developed catarrh. In the case of deep discrepancies prosthesis fornix there is decubitus ulcer with swollen and bleeding edges down. The ulcers are painful and are one of the causes of failure of patients using prosthesis. Acute decubitus ulcers roundel disappears after correcting the edges of the prosthesis, or ulcer becomes chronic. Around it there is hyperplasia of epithelium, sometimes in the form of petals covering the ulcer. The bottom ulcers can be clean, bleeding, sometimes covered with fibrous coating. In the study of biopsy material it is detected with symptoms of chronic inflammation and hyperkeratosis submersible epithelial proliferation. After removing the injury heals ulcer, leaving a scar that deforms difficult fornix and create locking valve (Figure 1).

Traumatic stomatitis occurs in almost all patients after the imposition of the prosthesis, but quickly disappearing due to margins corresponding correction basis. Less common decubitus ulcers are observed in patients using the old and deformed dentures. If, after the elimination of injury ulcer within 2 weeks does not heal, the patient should see an oncologist.

Prevention of traumatic stomatitis is in compliance with the principle of completeness treatment: doctor after the imposition of the prosthesis monitors the patient until it is satisfied that the foundation area tissues do not threaten injury. By preventive measures are also clear and complete instructions on how to use the patient's prosthesis and clinical supervision of patients who use removable dentures.

Notable in the aetiology of inflammation of the oral mucosa given chemical-toxic and allergic factors due to the continuous leaching ingredients acrylic plastic. During polymerization of monomer remains out of polymers, which results in its name - "residual monomer". In addition, poor value for monomer and polymer plastics in cooking helps release benzoyl peroxide, amines and other substances that are capable of performing local and general effect. Polymers - a

composition of low- and high product synthesis. In addition to the basic compounds, they contain non-polymeric intermediate components and ingredients that do not take the reaction, monomers, catalysts, accelerators, colorants. Since hardening plastics unstable,

Toxic stomatitis. Toxic stomatitis is of two kinds: hemical and bacterial. Chemicals often called acrylic because their causes are excess monomer in the basis of acrylate. A methacrylic acid of methyl ester is performed by their chemical nature monomer. All esters are known to irritate the oral mucosa, and in high concentrations monomer is protoplasmatic poison. In addition to local, monomer may have resorptive effects on the human body. This is possible by the high concentration of monomer fumes in the workplace, when violated safety.

The highest clinical interest is acrylic stomatitis observed in people who use plastic dentures. Their origin is associated with excess monomer in the base of plastic dentures in violation of technology and particularly the regime polymerization. Excess monomer appears while causing stomatitis. Keep in mind that the free monomer may appear with aging and plastic when it depolymerisation.

Guiding clinical symptoms of toxic acrylic stomatitis - a diffuse redness and swelling of the mucous membrane foundation area. Most inflammation occurs on the hard palate, at least - at the bottom of the toothless alveolar jaw. Plot inflammation usually coincides with the outside prosthesis (Figure 2). Patients complain of feeling burning mucosa during denture base, the tongue, and the lips. The differential diagnosis spends with contact allergy, but it is quite difficult due to the similarity of the clinical picture. Preventing toxic stomatitis is respect for the polymerization.

The second type of toxic stomatitis is caused by toxins of bacterial origin. They are formed by a low oral hygiene and poor care for dentures. In the mouth, the conditions for growth of microorganisms that alter its qualitative composition, in oral form increase the number of fungal microorganisms. Bacterial toxins - are products of bacteria and their destruction. The resulting toxins and cause inflammation of the mucous membranes. These canker sores can be prevented by careful care of dentures and oral cavity. An important role is played by sanitary propaganda, not in the classroom, and in the form of custom conversations with patients. With regard to what would have asked the patient to the dentist, he has to assess the state of oral health and overall quality of care including prosthesis.

Particular attention should be paid to the elderly, debilitated people, instructing them not only, but also relatives who care for them. The quality dentures, pores, poor polishing, repairing numerous delays always result in food on the surface of the prosthesis, and therefore - to the bacteria. It is also important to explain to the patient determination the timing of replacement dentures.

Allergic prosthetic stomatitis considered as delayed hypersensitivity. The main reason for their appearance is the development of hypersensitivity to the ingredients of organic and inorganic materials, which are made of dentures. Clinical allergies caused by basic materials so diverse that it is often difficult to distinguish from the clinical picture of other reactive changes that have other

causes and pathogenesis. In general terms one could say, firstly, a contact allergy, manifested by inflammation of the mucous membrane foundation area, is tissue that contacts the material base and, secondly, the allergic reaction with other systems.

Allergic inflammation of the flow-type contact stomatitis appears on the mucous membrane of the tongue, lips, cheeks, alveolar ridges and especially in the palate. It sharply restricted area denture base contact with the tissues. The mucosa is bright red, shiny (Figure 3). Patients complain burning oral mucosa, dry mouth, and blurred sense of taste, headache, and irritability. Complaints appear 5 - 10 days after the imposition of the prosthesis.

However, an allergic reaction can occur not only at the site of contact with antigen. There are patients with eczema, glossitis, stomatitis contact, or pica disorders, swelling of the lips, severe dermatitis of the face and hands, asthma, mumps and other allergic manifestations caused by acrylic dentures.

To distinguish allergic inflammation of the mucous membrane inflammation arising from other causes is difficult.

Note the inflammatory lesions of the mucous membranes caused by the use of removable dentures. They are characterized by a pronounced violation sensitive analysers feature mucosa. Primary dysfunction manifested by a sharp sense burning with dry mouth or feeling of burning pain, tingling, tingling.

Patients are vividly described the feeling as "coated tongue sensation" or "feeling pepper in the mouth." Hyperesthesia or paraesthesia phenomena are closely related to the prosthesis and topographically time, appear within the foundation area. They occur immediately after the imposition of the prosthesis and quickly disappear after withdrawal. The basis of primary dysfunction is functional and morphological disturbances in the final parts of the peripheral nervous system. Etiological role is played by a factor of thermoregulation violations mucosa.

Secondary dysfunction receptor system of the oral mucosa may be nothing to do with topography foundation area. They are the tip or the side of the tongue, the mucosa of the cheeks, lips. It is accompanied by severe vomit reflex hyper- or hyposalivation.

Vomit reflex is stimulated and controlled by nerve endings located in the mucous membrane of the soft palate, throat and tongue. The sensitivity of the soft palate to foreign objects - this is a normal protective reaction of the organism. However, in some patients it excessively severe and occurs even during minor dental manipulations in the mouth. It is known that marked vomit reflex can be a symptom of a number of organic diseases and functional disorders of the central nervous system.

The basis of secondary dysfunctions is the development of disease in the central parts of the analyser and vegetative nodes. Sam prosthesis acts as a trigger mechanism or becomes additional stimulus.

Many carriers' dentures observed lesions mucosal candidiasis. Candida belongs to the resistant flora of the mouth, is in 11 - 100% of healthy people.

In the mouth fungus exists in two forms:

1) as yeast cells (blastospores) diameter 1 - 4 microns;

2) pseudo mycelium or mushroom as threads thickness of 1.5 - 4.0 microns.

In addition, yeast cells, fungus and vultures in the budding parasitism. Number of Candida cells and their morphological features is an important to clarify the relation with the body of the fungus (saprofysm or parasitism).

The fungus breaks down the plastic, provides organic acids: citric, oxalic, succinic, acetic, gluconic, lactic.

With aging plastic changes its physical and chemical properties, there are the best conditions for the development of fungi. Products metabolic Candida (organic acids, CO2, pigments) are on review (pigmentation plate removable dentures), and through laboratory analysis of material taken from the prosthesis. Favourite spot fungus is the corners of the mouth, tongue, palate. In the corners of the mouth cracks covered with crusts; tongue folded, coated, reinforced horny. It is believed triad characterizes that candidiasis stomatitis: inflammation of the mouth, tongue, mouth corners, thus the diagnosis is established without laboratory testing.

In patients with candidiasis who use removable dentures plate of acrylic plastic, mucous membrane under the prosthesis hyperaemic, swollen, often observed papillomatosis, dry, i.e. clinical picture resembling allergic inflammation or mechanical irritation removable prosthesis. The main complaint is burning mucous membranes under removable dentures, usually on the upper jaw. Burning constant, increasing the use of acidic foods. The survey and inspection reveal long-term use of dentures (over 3 years) and poor hygienic care of them. Often patients have concomitant diseases: diabetes, glossalgia.

Thus, knowledge of clinical symptoms of the phenomenon of "intolerance plastic" in the mouth, the ability to match them with the quality of the prosthesis can determine the causative factors and draw the necessary treatment plan.

Diagnostics

In practice dentistry are still some difficulties in diagnosis, because there is no single approach to screening patients with prosthetic stomatitis remains imperfect differential diagnosis, prediction unresolved issues mucosal diseases.

The survey starts with the patient history taking, which should pay attention to the factors that contribute to the occurrence of allergies (concomitant disease burdened heredity). It is necessary to consider the presence of chronic diseases of the gastrointestinal tract, endocrine and cardiovascular systems.

Along with prosthetic-specific reception, issue should detect mental illness, psychological disorders, traumatic brain injury, and causes anxiety when visiting the dentist. A special place in history is the question of the nature and time of pain and other sensations, treatment conducted before.

At the same time to identify the aetiology of the disease and the degree of sensitization of the organism requires additional clinical - laboratory tests. They are divided into specific and nonspecific. Last involves identifying the secret of inflammation eosinophilia, thrombocytopenia or leukopenia and increase content and beta gamma globulin serum, but these tests do not allow to determine hypersensitivity to certain allergens.

Specific tests help identify the allergen and immune reaction to it. With specific clinical tests commonly used mucous and skin samples.

In recent years, some authors have suggested a lack of awareness of skin tests, inconsistency of the clinical picture. In addition, there are a number of contraindications to their use: a history of anaphylactic shock; acute and chronic infectious disease with complicated course; clinical symptoms of allergic reactions of the oral mucosa in materials that have caused allergy in a patient.

Most informative and safe are immunological tests "in vitro", which allow assessing the condition of blood cells. Indicators are positive immune response damages the presence of neutrophilic leukocytes (with Fradkin) reaction sintering leukocytes (RAL) and platelet agglutination.

The clinic has been applied prosthetic dentistry exposition provocative test. It is a while removing dentures that are suspected as allergens. Thus in patients allergic to plastic sharply reduced the number of clinical symptoms or they disappear.

The disappearance of pathological phenomena after removing the prosthesis from the mouth and their appearance after the introduction of the prosthesis in the mouth (provocation) are direct evidence allergic steps prosthesis.

Differential-diagnostic tests of chemical and toxic-allergic stomatitis

The main task of diagnosis - is to establish an etiological factor (the specific allergen, toxin-stimulus), and detection of background disease that alters the reactivity. Crucial have a history, typical complaints of the patient, the clinical picture.

I. Evaluation of the quality and accuracy of designs dentures. This assessment helps to differentiate inflammation caused by mechanical irritation, inflammation of allergic and toxic-chemical origin. The causes mechanical irritation can be long, sharp edges dentures, the roughness of the inner surface of dentures, deformed base, improve chewing pressure on some parts of foundation area due to improper methods of removing impressions incorrect setting artificial teeth; technical errors, violation of fixing dentures.

2. Review oral mucosa. To review mucosa reveals diffuse or focal inflammation, "absence" of inflammation. Focal inflammation associated with mechanical irritation, trauma prosthesis. Diffuse inflammation is often toxic or allergic genesis.

3. Chemical and spectral analysis of biological media (saliva). Explore 4-8 cm3 mixed saliva of the patient, collected in the morning on an empty stomach tube washed with boiled water. The analysis of saliva for the presence of trace elements is in the spectral conduct laboratory. Spectrogram evaluated qualitatively and quantitatively. Increased content of iron, copper, manganese, silver, gold, nickel, etc., and change the quality of the (appearance of new trace, titanium, chromium, lead, tin, cadmium, etc.). Show pronounced electrochemical process. For heavy metals, toxins (copper, cadmium, lead, tin, etc.). You can determine the critical concentration value (PC), which causes excess toxicity.

4. Determination of pH. The normal pH of saliva - 6,9-7,0. When inflammation in the mouth, when expressed electrochemical processes, diseases of the gastrointestinal tract, poor hygienic oral care and others. pH can shift to the

acid side (5,5-6,0). Acid production in plaque leads to local short-term and significant decrease in pH to 4,5-4,0.

5. Pain sensitivity mucosa duringdentures wearing. Quality Score is also a denture pain sensitivity mucosa under dentures. Thus, localized inflammation characterized by increased only local pain threshold (10 to 30 g / mm2). For much subtlety atrophy and mucosal prosthetic field increased pain sensitivity (over 10 g / mm2).

6. Hygienic evaluation dentures. It is necessary to examine dentures with hygiene items, because poor care of them leads to abundant microbial flora. On the prosthesis and mucous membranes can develop fungus Candida albicans. In these cases, you should take scrape. If the same phenomenon expressed glossalgia, it should take scrape and tongue.

7. Clinical analysis of blood. Take a blood sample of the patient without prosthesis and with prosthesis after 2 hours of wearing the prosthesis.

Toxic-chemical reaction is characterized by leukocytosis, decreased number of red blood cells, increased erythrocyte sedimentation rate, and allergic reaction - leukopenia, lymphocytosis, monocytosis, a reduction in segmented neutrophils (Table 1 and 2).

Table 1

This clinical blood at toxic reactions to denture acrylic

Indicator	Without prosthesis	With the prosthesis 2 hours.
Red blood cells 3.9-5,0 • 10^{12} / l	4.2 • 10^{12} / l	3.9 • 10^{12} / l
Hemoglobin 120.0-160.0 g / l	144.0 g / l	140.0 g / l
WBC 4.0-9.0 • 10^{9} / l	4.7 • 10^{9} / l	7.3 • 10^{9} / L
Neutrophils segmented (47-72%) 2.000-5.500 • 10^{9} / l	57%	65%
Lymphocytes (19-37%) 1.200-3.000 • 10^{9} / l	34%	27%
ESR mm / h	4	20

Table 2

This clinical blood test for allergies to acrylic dentures

Indicator	Without prosthesis	With the prosthesis 2 hours.
WBC 4.0-9.0 • 10^9 / l	6.4 • 10^9 / l	4.6 • 10^9 / l
47-72% segmented neutrophils	51%	44%
Eosinophils 0.5-5%	3%	3%
Lymphocytes (19-37%) 1.200-3.000 • 10^9 / l	24%	37%
Monocytes (3-11%) 0.090-0.600 • 10^9 / l	7%	10%
Plasma cells	2%	1:100

8. Test with exposure. At some time (1-2 days) prosthesis is removed from the mouth. This reaction is usually positive, the patient's condition improves.

9. Provocative test. Introduction implant degrades subjective feeling and clinical picture, the response is positive.

10. Leukopenia test. A patient taking blood from finger and calculate the initial number of leukocytes without the prosthesis in the mouth on an empty stomach, then re-examine the blood on the white blood cells after 3 hours of wearing the prosthesis. Balances are in the first and second tests.

Reducing the number of leukocytes 1,000 in 1 ml indicates the presence of sensitization to plastics test is considered positive.

Not recommended leukopenia test during the acute allergies, with an increase in body temperature and other physical disorders.

11. The test chemical silver surface acrylic prosthesis. The inner surface of acrylic denture washed with water detergent "news" or other degreasing agents and then sensitized plastic surface with a solution of tin dichloride SnCl. The mechanism of action of tin dichloride reduced to its adsorption on the surface of plastic when created crystallization centres that promote further metal recovery process.

Based on the chemical reaction is silver recovery of silver from its compounds. Ag N03 silver nitrate salt or complex Ag (NH3)2 is used for reactions. Formaldehyde is used as reducing glucose. The reaction on the inner surface of the prosthesis (denture outer surface is covered with wax) is deposited a thin layer of silver.

A test is considered positive if disappear or greatly diminish subjective feelings. State mucosal foundation area while also improving.

To determine the nature of the allergic reaction to plastic can be recommended method of passive transfer of antibodies - reaction Owari. Experiments conducted on guinea pigs.

For one experiment 6 animals were used. Patient serum in a dilution of 1:4, 1:10, 1:40, 1:80 and undiluted serum injected guinea pigs inside skin 0.1 ml 5 cm

in some places along the spine. As impose control serum of a healthy person. After 6 h. it is administered 0.5% Evans blue solution at the rate of 0.25 ml100 kg body weight. After another 20 minutes. 1 ml of antigen is injected intravenously. As the antigen used plastic monomer "Etakryl" olive oil diluted 1: 100. The reaction was judged by the appearance of intense staining at the site of serum containing antibodies. A positive reaction indicates the presence of specific antibodies in the blood.

12. Test to determine the activity of enzymes of saliva. The results of biochemical analyses show that activity and specific activity of mixed saliva enzyme (alkaline phosphatase, lactate dehydrogenase) in response to toxic acrylic plastics increased by 2-4 times, except for the acid phosphatase activity which is reduced. Increased enzyme activity is caused by the release of tissue enzymes in saliva mixed due to irritating effect of the chemical components of acrylic plastic. After treatment of prostheticdentures without dye, with soft padding "Eladent 100" specific activity of these enzymes is not fully restored.

The main tests for the diagnosis of "stomatitis toxic-chemical origins" are features of the clinical picture: First symptoms burning, hyposalivation (with acrylic prosthesis et al.); changes in pH toward acidic; reducing the activity of proteases, alkaline phosphatase, HRT, ATG and increase the number of HRT, ATG, LDH, alkaline phosphatase (with acrylic dentures); changing patterns of peripheral blood: leukocytosis, reduction of red blood cells, increased ESR.

The diagnosis of allergic stomatitis is based on clinical symptoms appear within 5-8 years after prosthesis that is expressed in the latent period of sensitization to different allergens, including monomer, and etc. However, local and general reactions to metals and acrylates, leukopenia, lymphocytosis, monocytosis; immunological changes: increasing the number of E-Rock, T and B lymphocytes with Fc-receptors for IgG; increase the number of T-lymphocytes and O receptor Cr; lower levels of SIgA, lysozyme in saliva; positive response inhibition of migration of leukocytes (RHML) (tab. 16).

Basic diagnostic tests with stomatitis toxic-chemical origin are defined by clinical, paraclinical, biochemical methods, and in allergic stomatitis - immunological and allergic.

Differential tests may serve some differences in clinical presentation related probably to the chemical class of toxic substances (monomer). Monomer is under strong burning prosthesis, drier than hypersalivation. In addition, there are large differences in pathogenesis, allergic stomatitis has a latent period (sensitization) and toxic-chemical reaction develops quickly and becomes chronic stage.

Burning symptom is available without mucosal changes typical non-allergic disease. It is more common in women during menopause. In such cases, allergy tests are negative, and the use of other prosthetic materials will have no effect.

Finding coated tongue, intensely horny, areas of desquamation, and thepatient should be referred to a general practitioner for examination of the

gastrointestinal tract. Must take scrape of the tongue (or other mucosal sites) in the presence of Candida.

Normally Candida found in the form of custom yeast cells. When the candidiasis is found in these cells in many of the fields in the form of mycelium or pseudomycelium has different lengths and thicknesses. When candidiasis pH - 6,0, 5,5.

Since history is necessary to clarify the status of menopause, diabetes. Clinical analysis of blood (increased blood sugar > 100 mg %) helps to establish the correct diagnosis. In this case, the patient should be sent for counselling and treatment to the endocrinologist.

Prevention of the harmful effects of dentures from acrylic plastic

Treatment of patients with prosthetic stomatitis is significantly different in different clinical forms. In addition to specific targeted therapy plays an important role pathogenetic treatment.

Turning to the causes of prosthetic stomatitis among the guiding factors called so-called "surface factor", the availability and allocation of free monomer and structural features of the prosthesis with its quality characteristics.

"Factor surface" is crucial to the final stage of production, when fit and putting the prosthesis.

The primary adjustment is intended to eliminate mechanical stimulation factors, easily detected. It asperity sharp edges and dentures be eliminated. The following correction quality made prosthesis is usually not necessary. If the correction does not eliminate the patient's complaints, the prosthesis should be processed.

Known opinion that the quality of the surface of the prosthetic basis determined by the method and mode of polymerization plastics. Thus, compression pressing excess material prevents full convergence halves of the cell, plaster casts deform and cause malfunctioning dentures. The latter circumstance contributes polymeric shrinkage, which in conventional technology reaches 7%.

The method comprising administering cast extrusion material in closed form cast through the channel, after which the material is compacted under pressure of 5.3 atmospheres. This method allows us to produce complex parts, because the material enters the mold in a liquid state and does not cause deformities. When casting extrusion polymerization shrinkage compensation is possible due to additional revenues through mass cast canal that reduces internal stress and increases the dimensional accuracy of parts.

Incidentally, the mode and method of polymerization are a reliable way to reduce residual monomer, which washed away with saliva. Using the method of compression-molding plastics residual monomer is much greater than in the dry polymerization.

Measures to eliminate the effects of residual monomer varied. In 1968, V. J. Kurland and colleagues suggested cover palate implant surface with a thin layer of silver. The therapeutic effect of this manipulation is explained shielding plastic,

avoiding direct contact with the mucous membrane of residual monomer (Figure 4).

A little later (1976), M. A. Napadova with a team of staff proposed a method of processing the finished prosthesis among solvents at temperatures that lie within the transition of polymers in highly state. It is possible to reduce the amount of residual monomer. It becomes less and the use of gamma - irradiation of ready-made prosthesis, ultrasonic processing, cleaning plastic samples in supercritical media. It is significantly enhances biocompatibility of the material, but may lead to changes in the structure of the surface (cracking, aggregation of globular structures).

Known methods of arc-plasmatic coatings of various materials, includes the use of titanium nitride as a protective coating of acrylic plastic dentures (Zabolotskyi Ya.V., Sysoev M.P.). As a result, the level of migration of residual monomer is significantly reduced - to 0,01-0,03 mg / l against 12,5-25,3 mg / l for the conventional technology. The absence of complications within 6 months of use prosthetic allowed recommending a technique for preventing prosthetic stomatitis.

Using fluoroplastic cover dentures can achieve reliable protection from mucosal tight mechanical and toxic-allergic action of acrylic plastic, as evidenced by the data presented in the works L. D. Chulak (1997).

Noteworthy use in polymerization of microwave energy, which improves the properties of plastics, reduces the time required to manufacture dentures ensures rounder adaptation (B. P. Markov, 1998).

Do not require a significant investment and changes in coating technology dentures monolithic plastic film of polycarbonate, acrylic processing bases in N-butyl ether acetic acid varnish coating containing base and complex allergy medications, anti-inflammatory, antimicrobial activity (Zhukov, 1997).

Unfortunately, all these methods make it impossible to eliminate the residual monomer output and bacterial contamination dentures (Hozhaia, 1988, Danylov, 1993).

Along with the data given on improving technology dentures with acrylates in the literature there is evidence of the search for new materials for dental prosthetics. If acrylates - is allergen, the best measure of prevention of allergic manifestations - the lack of dentures in the mouth. Increased tolerance dentures can be achieved using plastics such as "Acronil" "Bakryl" "Dacryl", which include less toxic ingredients copolymer.

There is another way of searching easing the harmful effects of removable dentures plate based on manufacturing-piece metal bases that do not contain acrylic applications as material for acrylic fixation of artificial teeth or dual-layer bases with elastic gasket around the foundation area area (Figure 5)

Do not forget determination technique preconditioning the oral mucosa. This vacuum treatment performs before prosthetics in the process of adaptation to the prosthesis (Ivannikov, 1992), treatment of foundation area current low voltage (electrical) and mucosal laser irradiation apparatus (Prohonchukov, 1998).

In addition, patients should teach oral hygiene to prevent the violation of the exchange and prosthetic candidiasis.

The main treatment of secondary dysfunctions receptor system performs a doctor - a neurologist. Over expressed vomit reflex action in eliminating annoying denture is crucial not implant length and density of its adhesion and uniformity of immersion in the tissue prosthesis foundation area. It is necessary to maximize compliance mucosa of the upper jaw mucous glandular zone. It should be paying attention to denture modelling of the upper jaw. It must meet the following requirements: a distal end denture base must be thin and smoothly move into the anterior; chewing teeth are located at the edges of the tongue or slightly towards the cheek and never hang over his back; in the case of large exaggerated tongue teeth must be wide enough and positioned according to the muscle neutral zone. For high vomit reflection of central origin should consult doctors - specialists.

To ensure positive results of prosthetic treatment removable dentures structures must carefully examine and interview the patient, consider Allergic status, a plan custom treatment.

Part VIII

TERMS AND FEATURES OF RE-PROSTHETICS OF PATIENTS WHO USE FULL REMOVABLE DENTURES

The question arises every time again prosthesis as soon as it becomes apparent that the prosthesis cannot perform the chewing function for the body at the right level, not providing aesthetic standards, and increasing other side of his actions threaten the integrity of its tissue foundation area. In other words, indications for re prosthesis are to reduce therapeutic, preventive properties and increasing load performance of the prosthesis.

Chewing efficiency estimate reported by the patient's ability to chew with dentures normal diet. In the evaluation of implant patients typically introduces an element of subjectivity, which prevents them timely to point out violations encountered.

More accurate data on chewing function can be obtained by functional tests. Research chewing function at different times after the imposition of the prosthesis revealed interesting patterns that help properly resolve the issue of the timing of re prosthesis.

Analysis of samples by chewing Y. S. Rubynov conducted after getting used to denture patients, showed that chewing slowly shrinking percentage chewing food increases, therefore increasing chewing index. Chewing index is the number obtained by dividing the mass of chewed food in milligrams at a time in seconds. If we take 12 seconds as a norm, the normal chewing index will be 800 mg / 12sek. = 66mh / sec.

The observed pattern is required for all patients. Further chewing continues to decline and the percentage of chewed food is increased. In this regard, the code and chewing are noted. This trend manifests itself within a year. Therefore, this time full dentures functional value reaches its maximum.

Through analysis of samples obtained in 2, 3, 4 years using dentures, it was also established that the percentage of chewed food is kept high (93,17 ± 6,03), but this is achieved by increasing the chewing time by half compared with those obtained in first year. In this regard, chewing index drops to 19,91 ± 2,9 mg / sec. Characteristically, chewing with dentures is always larger than normal. Increased time chewing and therefore increasing the degree and chewing food - is adaptive properties mouth.

Clinical observations (L. M. Perzashkevych; V.A. Kondrashova) lead to the conclusion that replacing dentures should be decided after three years of use. After 3 years of chewing efficiency remains high, but is achieved by lengthening the time chewing food, which shows a significant decrease grinding ability of artificial teeth.

The decision to re prosthesis can be made earlier if there will be balancing the frequent failure of the prosthesis, the pores in the base, deteriorating oral

health, violation of occlusion, tissue changes foundation area. Do not use common way of corrective prosthesis, including balancing relocation self-polymerised plastic. It forms a porous surface, compromising oral hygiene. By changing the colour, it also makes little use dentures. The best solution is laboratory relocation when correcting defects impression basis weight and then replaces it with plastic and polymerized. However, for this method, the prosthesis should be used temporarily only during a new prosthesis.

The sequence of clinical procedures in the re-treatment of prosthetic patients who previously used removable dentures, do not have different from the initial plan of prosthetics. But in the details, there are some features which knowledge will avoid failures. Features on the one hand generated character psychology of patients and the other - the emergence of new clinical symptoms not previously observed.

It should be noted that during the second prosthetic doctor dealing with a patient who had previously used removable dentures and psychologically well prepared for this. Treatment of these patients is facilitated because the bias disappears on denture inherent in many patients, especially women. Habits produced during the use of removable structures, facilitate adaptation to the new prosthesis, which is less burdensome and completed in a short time. These two factors turn the patient on doctor accomplice, facilitating prosthesis. However, these habits can cause failure of the patient to use the prosthesis if its design, for example, margins the base, changes.

Repeated prosthesis due to changed conditions in the mouth often has to solve fundamentally new problems that may arise when the patient first began to receive prosthetic care. This change primarily of occlusal vertical dimension in patients who have been using dentures with reduced occlusal vertical dimension, changing the boundaries of the prosthesis, causing an increase in its base, and finally change the width of the artificial dental arch.

Increasing of occlusal vertical dimension

Mistakes doctor in primary prosthesis can cause reducing occlusal vertical dimension in patients, who use dentures, imperfect methods for determining occlusal vertical dimension, grind plastic and natural teeth, dipping pairs of teeth-antagonists in the hole by functional overload their periodontal and simultaneous erasure plastic teeth and atrophy of the toothless alveolar jaw.

Therefore, there are several reasons for the decline occlusal vertical dimension. Not surprisingly, many patients have long enjoyed full dentures, reduced face distance. In some patients, this can occur without any complaints from other developing phenomenon arthropathy, maceration of the skin at the corners of the mouth and other symptoms. All changes appearance. It is natural that, making prosthetic treatment plan for patients with reduced height face doctor presented a choice: keep the new prosthesis former occlusal vertical dimension or normalize it according to custom anatomical and physiological characteristics.

Clinicians have different points of view. Some are in favour of maintaining the same occlusal vertical dimension. The justification for such tactics, in their opinion, is the continued adaptation of the masticatory muscles and joints to

occlusal vertical dimension, a change that allegedly put chewing apparatus in unusual conditions that impede adjusting to a new prosthesis. This view gradually gathers its supporters, although there is another view that recommends re-normalizes prosthesis occlusal vertical dimension. Increase occlusal vertical dimension to suit custom anatomical and physiological characteristics of the masticatory apparatus is considered as medical (increased chewing efficiency prosthesis, restoration and aesthetic standards of broadcasting, treatment arthropathy et al.) and a preventive measure to prevent possible complications of the hand of chew'

Immediately should answer another question: occlusal vertical dimension can be changed overnight, or in a significant reduction of this should be done in two or three steps? Specially made in these direction clinical trials (V. A. Kondrashov) found momentary expediency increase occlusal vertical dimension. Complaints of pain in the temporomandibular joint, muscle fatigue are rare; these phenomena are easily eliminated by a slight decrease occlusal vertical dimension.

Some patients after changes had occlusal vertical dimension subjective disorders (muscle fatigue). It does not show on the fallacy of the principle, and that he is not made and that this patient is not immediately able to determine the optimal occlusal vertical dimension that provides functional and aesthetic optimum. However, this view is not the ultimate truth.

Features of the construction margins and form the basis of dentures it during the second prosthesis

In the last 2-3 decades has tended to expand the margins of complete denture for the lower jaw. It carried out by coating the prosthesis base mucous tubercle, floors jaw-hyoid line, and broadening the base in the sublingual space. Consequently, foundation area surface increased and increased receptor field, irritation element that plays an important role in the adaptation of the patient to the prosthesis.

At the same time, there are patients who use dentures with small margins. Imposing of new prosthesis with an extended basis can cause the increase in connection with the receptive field turn prosthesis in a completely new and stronger stimulus. Such patients are difficult to adapt to new dentures, and the older people and those longer term use dentures, the harder and longer addictive.

Some patients stop use of the full removable denture for the lower jaw or often arbitrarily shortened lingual margin basis. In this case lasted old habit prevents relational prosthetics. Not always possible through persistent persuasion to overcome this barrier and psychophysiological prosthesis must be repeated, reducing the verge basis.

Keep in mind that simply shortening the denture base does not always ensure success. Thus, the best using the old prosthesis with shorter boundaries as customtray repeat prosthesis.

Another feature is repeated prosthetic teeth formulation, especially in dentures for toothless upper jaw. For durable dentures and omissions arising from atrophy alveolar bone of the upper jaw and therefore is flattening of the palatal vault. Atrophy of the alveolar bone is mainly from the vestibular surface, guiding

to a narrowing of the alveolar arch. On the lower jaw, on the contrary, there is more atrophy of hand Tongue that extends the lower alveolar arch. The process continues and the use of removable dentures.

In an effort to fulfil the rules of classical performances teeth, narrow artificial dentition, creating obstacles to the free movement of the tongue. Patients that reason complain lisp, fatigue Tongue. To address these disorders must increase their mouth due to the expansion of a new dental arch prosthesis. However, the shift teeth outside of the alveolar margin are only within certain margins. Often enough these margins, feeling discomfort persists palate has further grind down the surface of the posterior teeth.

Probability abuse fixing full dentures for such tactics negligible, since the aid of long habit patient use removable dentures, well-established and automatic locking valve retention, if, of course.

Another feature re prosthesis is a form of the old denture base, its thickness, etc. Change is possible speech and therefore a violation of articulation caused by the gradual flattening of the palatal vault, and the change of teeth.

Determine the causes of violations will broadcast speech sample. The patient was offered to say the words that contain a lot of sounds "S" or "Sh" (pine forest, rustling, etc.). These sounds are formed in contact with the surface of the tongue base, located well above necks of the teeth. During the pronunciation of sounds "L", "E", "T" tongue rests on the palate surface of the front teeth.

If the pronunciation of sounds "S" cause difficulties it is necessary to correct anterior palatal implant surface, removing the excess plastic to reduce the thickness of the base. Violation of pronunciation can be congenital. This violation is very difficult to remove. Pronunciation may change by reducing occlusal vertical dimension and narrowing of dental arcs - then you need to increase occlusal vertical dimension. It is best to put thin teeth, and from palatal side to remove as much wax. Sometimes significant violations need to increase the space for the tongue by the nomination front teeth.

Violation pronunciation of sounds "e", "t" must move the front teeth labial reducing the thickness of the base, or put finer teeth. If these measures are not increased space for the tongue and did not give a positive result may help to replace the plastic base metal.

Consequently, the re prosthetic patients should carefully examine the atrophy of the alveolar, alveolar constriction of the arc, the shape of the old prosthesis, its thickness, teeth set-up on the old prosthesis. All this must be taken into account in the second prosthesis; especially those who come for professional activities have a lot to say.

Appendix to Part VII

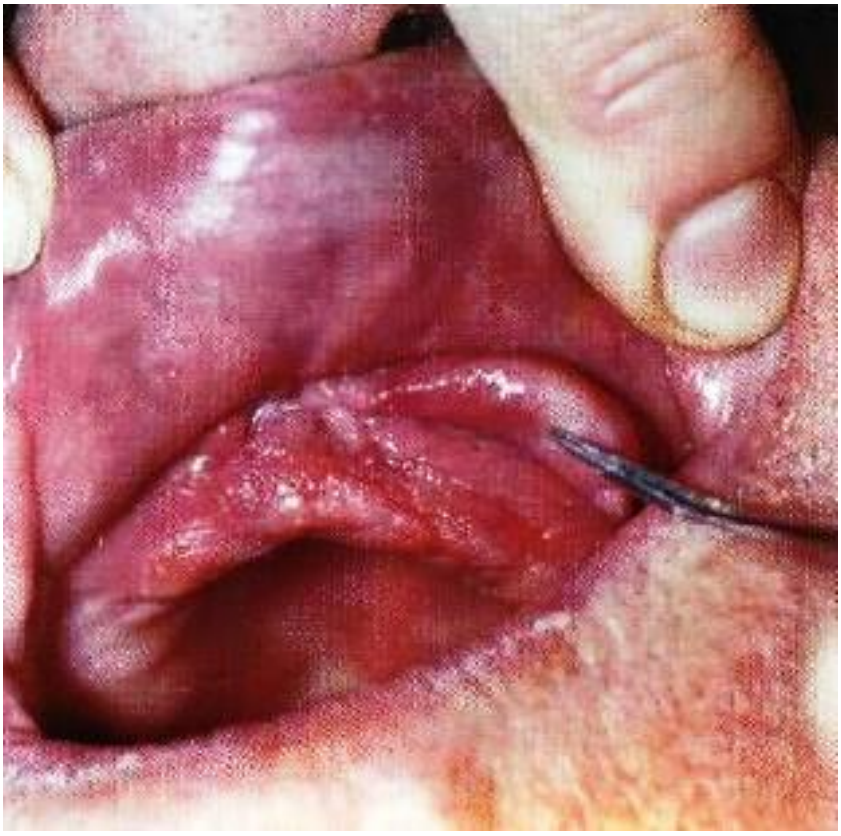


Fig. 1. Traumatic stomatitis

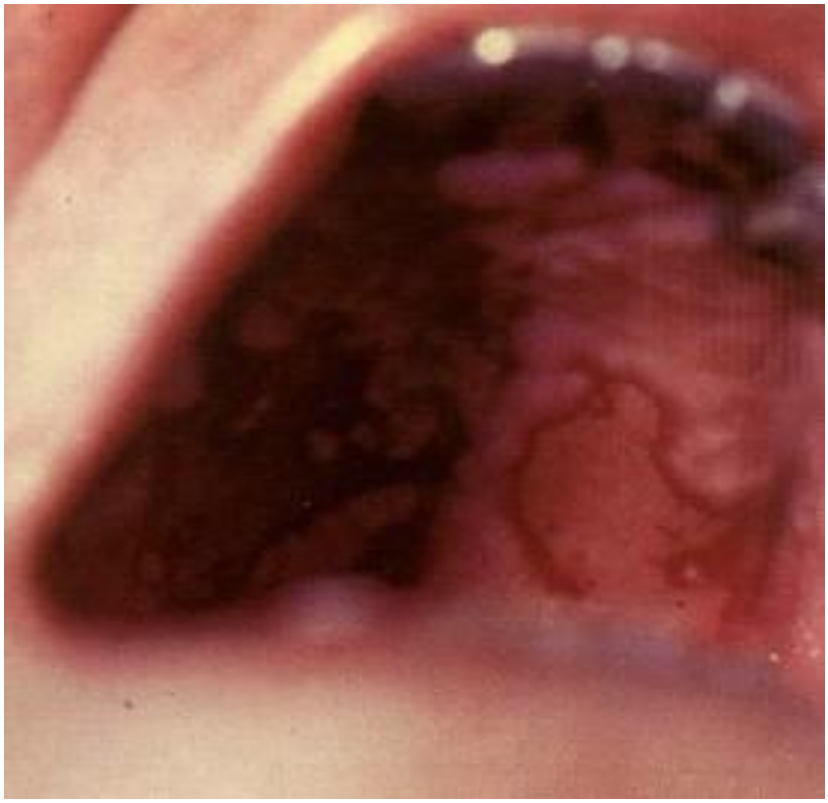


Fig. 2. Toxic stomatitis

Fig.3 Allergic stomatitis

Fig. 4. Screening denture base with silver

Fig. 5. Dentures with elastic lining