

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

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protocol № 1
Head of department _____ L.V. Smaglyuk

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

Academic discipline	Orthodontics
Module № 3	Children's dental prosthetics
The theme of the lesson № 12	Methods of diagnosis of dento-gnathic anomalies.
Course	V
Faculty	Preparation of foreign students

Poltava 2017

1. The relevance of the topic.

In modern conditions, people pay more and more attention on facial aesthetics, harmony of its structure. Violations of the dento-alveolar region can be prevented by using preventive measures, using the knowledge of morphological and functional age-related peculiarities of formation and development of dento-alveolar region. Rational orthodontic treatment is possible only after performing a comprehensive differential diagnosis, it is therefore important that the doctor possessed the necessary knowledge for the effective clinical assessment of orthodontic status of the patient.

2. Specific objectives:

To explain methods of diagnostics of malocclusion.

To explain clinical methods of diagnostics of malocclusion.

To explain anthropometric, biometric and graphic methods of diagnostics of malocclusion.

To explain functional methods of diagnostics of malocclusion.

To explain X-ray methods of diagnostics of malocclusion.

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

Name of previous disciplines	Skills
1. Anatomy	Describe the structure of the cerebral and facial departments of skull, jaws, attachment of the facial and masticatory muscles. To assess the development and the proportionality of the size of the face, jaws.
2. Normal physiology	To describe the physiological act of a mastication, swallowing, speaking, breathing
3. Radiology	To know radiology diagnostic, cephalometrics. To determine the form of malocclusion according to the lateral cephalometric.
4. Pediatric dentistry	To know the growth and development of the facial skeleton and of muscles in the age aspect, the timing of teething.
5. Prophylaxis of stomatological diseases	To write down the tooth formula (clinical, anatomic, by WHO), determine bite period and dental age
6. Propedeutics of a therapeutic odontology	To define teeth according to the bite: temporary or constant occlusion

4. Tasks for independent work during preparation to the lesson and the lesson

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation to the lesson:

Terms	Definition
1. Subjective examination.	A stage of clinical survey in which interview of the patient.
2. Passport (chronological or calendar) age.	This is the period from birth to any particular moment of life.
3. Biological or anatomical and physiological age.	Is determined by the set of metabolic, structural, functional, and regulatory characteristics of adaptive opportunities of an organism and is a required function of time, but unlike a passport, is characterized by less distinct intervals of time, during which irreversible age-related biological changes in the body.
4. Bone age.	The age of a person is determined by the condition of the bone system.
5. Objective examination	A stage of clinical survey in which carried out examination of the patient (posture, face, maxillofacial area). The main admission objective of the examination of the orthodontic patient includes a general examination, determination of Constitution and characteristics of the face structure, the examination of the oral cavity.

4.2. Theoretical questions to the lesson:

1. What parts do clinical methods of examination consist of?
2. What is the biological age of a person?
3. The dates of determining the bone age of a person.
4. What etiological factors influence the development of the dento-gnathic apparatus in the antenatal period
5. Features of function of closing of lips at children.
6. Clinical signs of parafunction closing of lips.
7. Special methods of determination of parafunction closing of lips.
8. Features of function of mastication at children.
9. Clinical signs of parafunction mastication at children.
10. Clinical signs of parafunction swallowing at children.
11. Determination of parafunction swallowing at children.
12. Clinical signs of parafunction breathing.
13. Special methods of determination of parafunction breathing at children.
14. Clinical signs of parafunction speech at children.
15. Determination of parafunction speech at children.

4.3. Practical work (tasks) that run in class:

1. To determine the period of the formation of occlusion.

2. Describe the methodology of conducting clinical functional tests in patients during periods of temporary, mixed, permanent occlusion.
3. To inspect the face, vestibule of the oral cavity, the oral cavity of patients during the period of temporary, mixed, permanent occlusion.
4. Describe the dentition in three planes for patients in periods of temporary, mixed, permanent occlusion.
5. To be able to take impressions of patients during periods of temporary, mixed, permanent occlusion.

The content of the topic:

Biometric and graphic research methods in orthodontia

Diagnostic models are such models of jaws which are used by orthodontist for conducting biometrics researches of and for the comparison of the received results in the course orthodontic treatment.

On models we mark the last name, name of patient, age, date of removal of prints, and also sequence number of individual patient card.

For determining sizes of teeth, dental rows, apical bases of jaws orthodontists apply the modified trammelhead or special measuring devices, and also different adaptations like orthochrist, summetroscope, orthometer. The study of diagnostic models of jaws is conducted in three mutually perpendicular planes: middle- sagittal, vertical and horizontal (occlusive or lateral) and in three directions: sagittal, vertical and horizontal.

Determining of sizes and form of teeth.

V.L. Ustimenko (1955) suggests to select three forms of frontal teeth of permanent bite: rectangular, three-cornered or wedge-shaped and oval.

In orthodontic practice orthodontists usually measure three sizes of teeth: width, height and thickness. Most often we measure mesio-distal sizes of teeth, i.e. width – at all teeth on equal to the most protuberant part of crown of the tooth (equator), and at lower incisor teeth – at the level of cutting edge.

Middle width (in mm) of temporal teeth (by Vettset)

Jaw	Incisor teeth: central / lateral	Canine teeth	Molars first /second
upper	6,75 5,40	7,10	7,20 8,0
lower	4,55 4,85	6,10	6,0 10,75

Comparing of the measured width of crowns of the temporal and second teeth to their average size, resulted in tables, lets to define the changes of their sizes (macro- and microdentia).

The width of crowns of the temporal and permanent teeth is different. Sum of width of crowns of overhead permanent chisels is on the average 7,1 mm bigger, than temporal, and lower – chisels 5,3 mm bigger.

For vestibular or oral locations of central incisor teeth a place for these teeth is determined by measuring of distances between the contact points of nearby teeth

(mesially and distally). Comparison of width of anomaly located crowns of teeth and presence of place (size of intervals between teeth) which is present for them in a dental row permits to define a presence or deficit of place. Deficit of place on 1/2 and more of the width of crown anomaly located tooth for the choice of method of treatment is an absolute testimony to treatment with the delete of separate teeth.

The height of crown part of frontal teeth is measured from the cutting edge of tooth to its cervical scopes in the middle of vestibular surface, and at lateral teeth – from the middle of cheek tubercle to cervical scopes.

The thickness of crowns of the teeth is measured for frontal and lateral teeth as their vestibulooral size.

Determination of proportion of sizes of incisors of upper and lower jaws

Tonn defined straight proportional dependence between the sum of width of crowns of overhead and lower chisels in a permanent orthognathic occlusion. The index of Tonn is evened 1,35.

$$SI : Si = 1.35$$

Where **SI** is a sum of width (mesio-distal sizes) of 4 upper incisor teeth, and **Si** – sum of width (mesio-distal sizes) of 4 lower incisor teeth.

Due to this formula it is possible to define the deficit of place for upper incisor teeth and individual macrodentia.

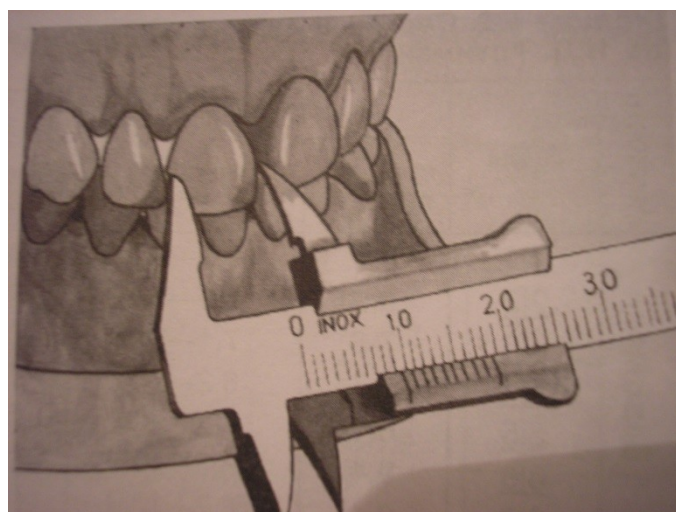
Absolute macrodentia is diagnosed in those cases, when the sum of width of crowns of upper permanent incisor teeth is even or large than 35,0 mm, and lower incisor is more than 27 mm.

Relative or individual macrodentia is determined by taking into account the form of face. For the narrow and extended face of $SI = 33-34$ mm, and Si 26-27 mm. Microdentia is diagnosed at the sum of width of crowns of overhead permanent incisor teeth less, than 28 mm, and lower incisor teeth – less than 20 mm. Comparing date, got by calculations in accordance to formula (1) and because of measuring of width of upper incisor teeth, we get the size of insufficiency of place for incisor teeth.

$$Si \times 1,35 = \text{sum of width of 4th upper incisor}$$

Comparison of date which got in obedience to calculations according to formula 2 with the sum of mesio-distal sizes of 4th incisor teeth on the diagnostic models of the inspected patient permits to conclude about the presence of relative microdentia which can result in to crowding of frontal teeth of different kinds.

Dolgopolova defined by the method which was developed Tonn, correlation of sum of width of crowns of temporal overhead and lower incisor teeth and confirmed their interconnection at a temporal orthognathic occlusion. The index of Dolgopolova totals 1,3.



Determination of length of dental rows

Determination of length of dental row is conducted after the method of Nance. For this purpose a ligature wire is placed from the distal surface of the first permanent molar of sides of dental row through the middle of masticatory surfaces of lateral teeth and cuttings edges frontal to the distal surface of first permanent molar of opposite side, giving the wire the form of dental row. Length of dental row must total the sum of mesio-distal sizes 12 permanent or 10 temporal teeth.

Determining dental rows width

In the period of permanent bite for determining lateral sizes of dental rows we apply the method of Pont (1907), that based on straight proportional dependence between the sum of mesio-distal sizes of 4th upper incisor teeth and width between first premolars and first molars on upper and lower jaws. For this purpose Pont offered measurings points on upper and lower jaws which coincide during closing of dental rows of permanent orthognathic occlusion, and accordingly the width of dental rows in these points is identical. On the first premolars width of supramaxilla is measured between points which are located in the meadle of intertubercular fissure, and on a lower jaw is a distal point of first premolar which is tangent to second premolar (contact point between premolars).

On the first molars width of supramaxilla is measured between points in the front deepenings of longitudinal fissure, and on a lower jaw - between the distal tubercles of cheeks of first molars.

Pont defined indexes, in according to which it is possible to define the indexes of width of dental rows in the area of premolars and molars depending on the sum of mesio-distal sizes of 4th overhead incisor teeth.

$$\text{Premolar index} = \frac{\text{Sum of mesio-distal sizes of 4th overhead incisor teeth}}{\text{Distance between premolars}} \times 100\% = 80$$

$$\text{Molar index} = \frac{\text{Sum of mesio-distal sizes of 4th overhead incisor teeth}}{\text{Distance between molars}} \times 100\% = 64$$

Determining of sagittal sizes of dental rows

Korkhaus defined certain interconnection of sum of mesio-distal sizes of 4th overhead incisor teeth and front run of dental arc length. Here is the table of measurings proposed by him. The indexes of table are diminished on 2-mm (thickness of overhead incisor teeth), they can be the front run of lower dental arc lengths used for determination. Indexes of front run of overhead and lower dental arc length can be identical to direct (orthogenic) bite.

Indexes of front run of overhead dental arc length after Korkhaus

Sum of mesio-distal sizes of 4th upper incisor teeth	Length of front segment of overhead dental arc
27.0	16.0
27.5	16.3
28.0	16.5
28.5	16.8
29.0	17.0
29.5	17.3
30.0	17.5
30.5	17.8
31.0	18.0
31.5	18.3
32.0	18.5
32.5	18.8
33.0	19.0
33.5	19.3
34.0	19.5
34.5	19.8
35.0	20.0
35.5	20.5
36.0	21.0

Determination of parameters of apical base.

N.G. Snagina confirmed the method of A. Howes (1957), that defined proportional dependence of sizes of dental arcs and their apical base straight.

In lateral direction the width of apical base is measured on a supramaxilla between the most deeply located points of fossulas of canines, on a lower jaw – stepping back on 8 mm downward from the place of crossing of horizontal line which connects the necks of stomach-teeth and first premolars, and vertical which passes through the apex of their inter-gingival papilla. In a norm the width of apical base of supramaxilla totals 44%, and lower jaw – 43% from the sum of mesio-distal sizes the 12 second teeth of every jaw.

In: $\sum 12d = 43 : 100$ (for a maxilla)

In: $\sum 12d = 42 : 100$ (for a lower jaw)

Narrowing of dental row is usually accompanied by narrowing of apical base. After N.G. Snagina, there can be 2 degrees:

I degree – the width of apical base totals 42-39% on a supra-maxilla and 41-38% – on a lower jaw.

II degree – the width of apical base totals 39-32% on overhead and 38-34% – on a lower jaw.

There is a hope that at narrowing of I degree, after expansion of dental row there will not be a relapse of anomaly. At narrowing of the II degree there are testimonies to diminishing of sizes of dental arc due to the delete of separate teeth for the removal of disparity between the sizes of dental arc and apical base.

For determination of relation of length of apical base to the sum of mesio-distal sizes the 12 second teeth N.G. Snagina suggest to use the following formula:

$L : \sum 12d = 40 : 100$ (for a lower jaw)

$L : \sum 12d = 39 : 100$ (for a supramaxilla)

According to N.G. Snagina measuring of length of apical base on a supramaxilla is conducted from a point between central incisor teeth in the area of necks of teeth on a palatal surface, and on lower jaw - from the front surface of cuttings edges of incisor teeth to the line which connects the distal surfaces of the first permanent molars.

For children with a temporal bite a width of apical base is 55,7% on overhead and 50,0% on lower jaws from the sum of mesio-distal sizes 10 temporal teeth.

In the period of temporal bite the width of apical base is determined between the apexes of roots of canines and first temporal molars. Points for measuring are in deepening according to the projection of apex of dentilngual papilla between afore-mentioned teeth.

Graphic research reception of form and sizes of dental arc.

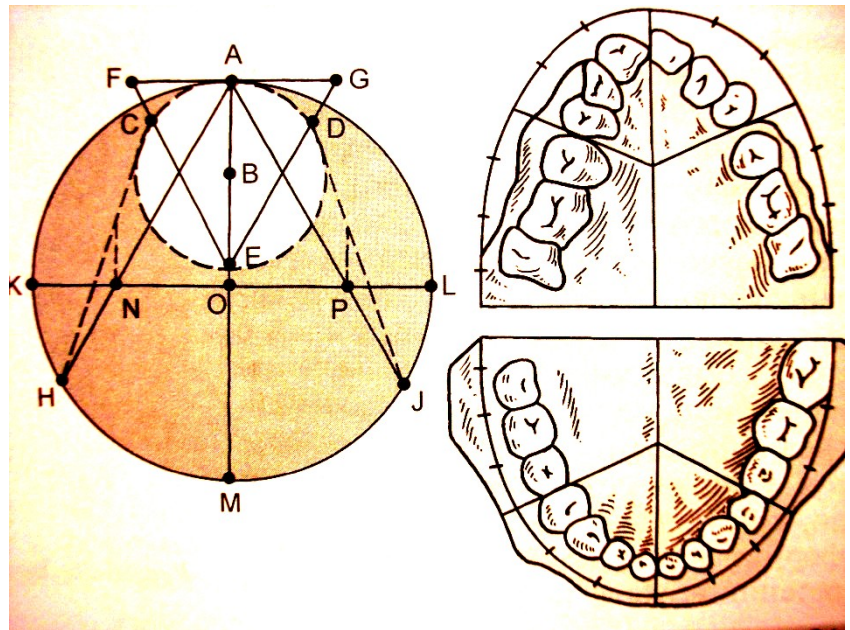
The construction of diagram of **Hawley-Herber-Herbst** occupies an important place in determination of the normalized form of dental arc.

For construction of diagrams we measure the mesio-distal sizes of 3 frontal teeth (central and lateral incisor teeth and canine) and add them up. It makes the size of radius of **AB**. From a point **B** we describe a circle the radius of **AB**. By the radius of **AB** from point **A** on either side we put aside the segments of **ACC** and **AD**. An arc of **CA** is a curve of location 6 frontal teeth. For determination of location of lateral teeth describe another circle. From a point **E** draw a straight line through points **C** and **D** and get the triangle of **EFG**. By a radius which equals a size to the side of triangle of **EFG**, from a point **A** mark on continuation of diameter of **AE** a point **O**, from which describe a circle the radius of **FE**. From the point **M** on an additional circle, put aside on a size **AO** points **J** and **H**. Unite point **H** with point **C** and point **J** with point **D**, get the curve of **HCADJ**, that represents the curve of location of lateral teeth after **Hawley**. On the segments **HC** and **DJ** lateral teeth must be disposed. **Herbst** united principle of **Herber** (ellipse) and **Hawley**, replacing direct touch-lines the arcs **CN** and **DP**. Focis for these arcs are points **L** and **K**, that located on a diameter which is perpendicular the diameter of **AM**. The arc **CN** is described the radius of **LC**, and arc of **DP** - by the radius of **KD**. Thus the arc of **NCADP** has the rounded lateral areas and there is crooked, which corresponds the ellipsoid form of normal overhead dental row.

Depending on the width of 3 frontal teeth on transparent celluloid tape draw a few different diagrams which create possibility to pick up necessary for comparing to the diagnostic model. With the purpose of determination of form of dental row a diagnostic model is laid on on a diagram so that a middle line which passes on a palatal stitch coincided with the diameter of **AM**, and the sides of triangle of **FEG** passed between canines and premolars. Then a pencil is outline the contour of

dental row of diagnostic model and compare to the built curve on a diagram.

Thus the conducted biometricss and graphic research methods allow skilled to define violation, which happened in the structure of dental row at a certain malocclusion or deformation of bite, to define a method and work out a plan of treatment.



Functional

methods of research in orthodontics

The functional methods of research give much information at presence of different anomalies and deformations of the bite. It can help with compiling the further plan of treatment and to diminish the possibility of relapse. We explore the basic functions of oral cavity: closing of lips, mastication, swallowing, breathing and speech.

Function of closing of lips may be violated because of dental anomalies. With lips closed without tension there is the myodynamic equilibrium of muscles of the tongue from within and mimic and masticator muscles from the outside. The back of the tongue adjoins the hard palate, and its lateral parts – adjoining teeth and alveolar sprouts, thus compensating the same pressure of masticatory and mimic musculature. The apex of the tongue is variously disposed.

The violation of closing of lips can be the symptom of parafunction of breathing and a symptom for an open, progenia and prognatia bite and also can be observed as symptom for the short upper lip.

For confirmation of degree of parafunction of closing of lips we conduct electric miographic research, if we deal with violation of position of the tongue – we run lateral sciagraphy with contrasting of the tongue and soft palate.

Function of mastication. It is one of the basic functions of oral cavity. For research of mastication function we conduct functional masticatory tests, such as masticatiografy, gnatodynamometry, myotonometry and electromasticatiografy.

We select 3 phases of lower jaw motion during at the act of mastication.

In the first phase the lower jaw goes down and is displaced ahead and aside. At this time the bitten off part of the meal due to the activity of cheek and tongue muscles is displaced on the dental rows of the working chewing side.

In the second phase the lower jaw rises, the hillocks of molar and premolar contact the hillocks of teeth of antagonists of maxilla, thus squashing the meal.

In the third phase the lower jaw moves horizontally in the direction of sagittal line, and grinding of meal (milling) takes place. The dental rows close up again in central occlusion, thus completing the masticatory cycle.

Masticatory cycles will proceed until there is a necessary consistency of meal. During the closing of molar the medial rollers of cheek muscles touch the teeth, forming so-called «cheek pockets». The squashed between teeth meal gets in these pockets and in the tongue jaw groove. With the repeated masticatory cycle due to the reduction of cheek muscles and muscles of the tongue the meal is delivered on dental rows for further softening. While grinding parts of the meal are soaked by saliva, watered by mucin, and stuck together in a food clump that moves up to the root of the tongue and is placed in the groove that has been formed there earlier. The volume and degree of grinding the meal is controlled by the receptors of mucus cheek, gums and the tongue. Due to it there takes part sorting of parts of meal: crushed parts form a food clump, big parts will be ground again and undeatable parts are pushed by the tongue and are extracted from the oral cavity.

Masticatigraphy is the method of registration of lower jaw motions at the time of mastication. It was offered and developed by I.S Rubinov. Curve, which is registrated by it, is called Masticatigraphia. It consists of masticatory waves, which reflect lowering and getting up of the lower jaw and masticatory period, that includes the complex of lower jaw motions, related to chewing of meal from the beginning of its introduction in the oral cavity to the swallowing.

In every masticatory period we distinguish 5 phases:

First phase – phase of rest; corresponds to the period of time before the introduction of the meal in the oral cavity. The lower jaw is immobile, the muscle tone is minimum and the lower dental row is remote from the upper dental row for 2-8 mm. This phase is registered as a straight line at the beginning of masticatory period at the level between the base and the top of the undulating curve.

Second phase – introduction of the meal in the oral cavity. It is registered graphically as the first ascending knee, that begins from the rest line. The scope of this knee is maximally expressed, and the steepness of it specifies the speed of meal introduction.

Third phase – the beginning of mastication functions, it begins with the top of ascending knee and corresponds to the process of adaptation and primary grinding of the meal.

Fourth phase is a basic masticatory function. It is characterized graphically by correct masticatory waves. Character and duration of these waves at a normal masticatory function depend on the consistency and size of the meal.

Fifth phase – the formation of food clump with its following swallowing begins with the end of the basic phase of mastication. Fifth phase is as presented graphically an undulating curve with diminishing height of waves.

Masticatory tests. The process of mastication has unique characteristics and features which are provided by speed and adequacy of forming of the food clump. The value of this function requires estimation, especially at presence of

pathological results of the conducted orthodontic treatment for restoring the masticatory functions, or efficiency.

Under *efficiency of mastication* we understand the degree of grinding of meal by dental system while chewing.

Test of Gelman (1932) is the modified test of Christiansen. A patient is offered to chew 5 g of almond during 50 seconds. Chewed and dried out mass is sieved thorough openings of 2,4 mm. Masticatory efficiency is estimated on the remnants on the sieve. The rest in 1 g equals 20% loss of masticatory efficiency.

Test of Rubynov (1951) belongs to the most physiological methods for determination of masticatory efficiency.

Myotonometry is the record of muscles tone more frequent by masticatory muscle. We apply mechanical, electric semiconductiver myotonometers.

Electromyography (EMG) the most informing method of determination of functional state of muscles is electromyography. Electromyography is a registration of bioelectric potentials, which are created in muscles in the moment of their excitement. The explored electric activity characterizes the response of muscle, that depends on peculiarities of its enervation. With the help of electromyography we study functional state of surface located muscles of the face (mimic, temporal, masticatory and sublingual muscles).

When researching sublingual muscles we impose an electrode on the middle of triangle, formed by the corner of the lower jaw, the chin and the hyoid bone; when researching a circular muscle of the mouth – we impose an electrode to the left of the philtrum of the upper lip; when researching mental muscles – we impose an electrode.

EMG registers motionless position of maximal volitional compression of dental rows, mastication and other functional loadings (pulling out of lips in a tube, etc.). The choice of functional test depends on the explored muscle and on the aims of a researcher.

The most informing test for the registration of mastication function is mastication of hazel nuts - 800 mg.

EMG is estimated according to a form, amplitude and temporal indexes. Amplitude gives the idea about power description of a muscle. Analysis of periods of bioelectric activity corresponds to the contraction of a muscle. Relative bioelectric rest, when there is weakening of a muscle, gives the idea about processes of excitement and slowing down, about endurance of a muscle.

Thus, EMG allows not only to define the reason of dento-facial anomaly, but also to choose the construction of the apparatus, to define a set of miogymnastical exercises and to define the time of retention period.

Function of swallowing. When forming of food clump there takes place the act of swallowing. It is an independent reflex act of transferring a food clump from the oral cavity through the gullet in the stomach. Swallowing is a chain of interdependent successive processes, where three phases are defined: mouth or arbitrary phase; upper esophageal or involuntary phase (slow and short), lower oesophageal or involuntary phase (slow and long).



When there is a wrong swallowing, teeth are not closed, the tongue contacts lips and cheeks. It is possible to observe when lips are quickly opened with fingers. When there is a swallowing (infantile type), there is a compensatory tension of mimic muscles in the area of corners of the mouth, the chin. Eyelids sometimes tremble and close up. A patient stretches neck and stoops. Characteristic tension of mimic muscles is noticeable; due to deepening's point on the skin in the area of mouth corners, the chin (symptom of «thimble» or «lemon crust»), suction of the lips, the cheeks.

Function of speech. Speech is a specific form of activity provides communication between people. In the process of growth and forming of a child's body there takes place the formation of speech: a child is taught by relatives, and environment.

In the medical practice violation of **speech** is called **dyslalias**. Dyslalias can be the result of damage of organs of the oral cavity, absence of teeth, presence of dental anomalies. Dyslalias is divided into 3 types according to its localization:

Palatolalias – is connected with pathology of soft palate and hard palate (new formations, paresises, cracks, etc.).

Glossolalias – is connected with the anomalies of structure and parafunctions of the tongue.

Dntolalias – is connected with the violation of teeth form and their location in the alveolar arcs, and by absence of teeth (by the partial adentia).

Palatographia is the most informing method of study of speech function. It is a registration of the tongue contact with a palatal vault and teeth at the time of pronunciation of different sounds. For receiving the palatographia we make a dark lamina, that adjoins the hard palate densely, it is entered into the oral cavity and at the same time a patient pronounces sounds that we explore.

Breathing function. With the purpose of prevention or warning of development and treatment of many types of dental anomalies, it is necessary to normalize breathing function. For the research of breathing function we run a simple method, a test with wadding fibers.

We conduct researches of the nasal breathing with the help of rinopnevmometer, constructed by V.A. Distol with coauthors (1993). Rinopnevmometer is constructed on the base of tonometre.

The conducted researches of functions of oral cavity will allow to choose methods of treatment more precisely and to prevent the development of anomaly relapses.



X-ray method of diagnostics

Intraoral contact radiography shown in the presence of diastemas, anomalies of position of individual or groups of teeth, presence of supernumerary or impacted teeth, to determine the degree of root resorption, time and the stage of formation of permanent teeth roots.

Intraoral contact radiography allows to determine the following:

1. The belonging of teeth to temporary or permanent occlusion.
2. The degree of resorption of temporary teeth roots.
3. The presence, location, extent of formation of the permanent tooth follicle.
4. The ratio of permanent and temporary tooth follicles.
5. The stage of permanent teeth roots formation.
6. The condition of the palatal suture.
7. The status of periapical tissues supporting the teeth.
8. The size of the tooth which is not erupted.
9. The presence of supernumerary and impacted teeth.
10. The presence of fracture tooth or tooth root.

The size of the tooth which is not erupted, determined by the formula:

$$X = (x \times y) : Y$$

Where X is the size of the tooth which is not erupted; x – size of the tooth which is not erupted, on the radiograph;

Y - the size of the eponymous tooth of the opposite side that was cut;

y - the size on the radiograph.

A common way intraoral survey is occlusal x-rays, which can be used to:

1. The plot of greater length.
2. The presence and location of impacted teeth.
3. The condition of the palatal suture.
4. The presence of stones submandibular and sublingual salivary glands.
5. The presence of the fracture line after trauma.
6. The presence of the crown or root fracture after the tooth trauma.

Taking of occlusal x-rays doing for the examination of children and adolescents with impaired opening of the mouth and in case of hypersensitivity of the mucous membrane of the mouth, which leads to increased gag reflex.

Radiograph of the palatal suture. In those cases, when diagnosed with narrowing of the upper jaw or her dental arch and planning of the expansion, and for the treatment of diastemas, shown radiography of palatal suture.

More pronounced palatal suture is determined at the diastemas. Width and density often correspond to the size of the diastema. When small size of diastemas the palatal suture of medium width and density, and the diastema size 4-5 mm broad and thick.

For the rapid expansion of the maxilla with fixed orthodontic appliances sometimes the disclosure occurs (rupture) of palatal suture. In such cases the radiograph in the area of palatal suture see a dark stripe of moderate expansion gap is not observed. Sometimes there is only a small bone thinning and expansion of the gap between the roots of the central incisors is closer to the top of the alveolar process.

In some cases it is necessary to estimate the parts of the upper and lower jaws, TMJ, facial bones, which are not necessarily obtained on snooty images or they are only partially visible. On extra-oral shots, the image of the teeth and surrounding tissues obtained less than structural. Therefore, such images are used only in cases where to obtain intraoral radiographs impossible (increased gag reflex, lockjaw, etc.).

X-ray of lateral projection of the lower jaw body and the branches. On extra-oral radiographs of the body and the branches of the lower jaw have the opportunity of studying the ratio of their sizes, the measurement of the angle of the mandible and the nature of teething "wisdom".

Radiography of the temporomandibular joints. Indications for application of this method is the presence in patients of complaints or symptoms related to TMJ or the presence of dental anomalies associated with displacement of the lower jaw (distal, mesial, cross bite). Plain radiography of the TMJ is carried out by the method of Schuller, Parma etc.

Method Parma – contact close-up shots, which can be done by a dental x-ray machine after removal of the tube. According to the method of Parma, you can obtain functional radiographs of the temporomandibular joint. This is made by two images at the open and closed mouth (closed the teeth in the position of central occlusion).

On these radiographs is determined by:

1. The position of articular heads in particular fossae.
2. The ratio of the articular heads, and other elements of the joint.
3. The width of the joint space.

Schuller Method. To obtain images of joints by the method of Schuller photography is carried out with a special tube with a length of 50 cm. At the angle of inclination of 30°, central ray directed to the area of the skull of a healthy side (for the palm width is above the external auditory canal), while it goes through the ear hole of the investigated parties that is nearly axially through the articular head.

On the radiographs obtained by this method, we can identify:

1. The contours of the joint elements.
2. The relationship between elements of the joint.
3. Gross pathological changes.

However, this conclusion is unsuitable to study the function of the TMJ. In addition there are various distortions, especially the width of the joint space. Also difficult to see small changes in the joint in the picture.

Tomography – layer-by-layer image of the object on the x-ray film – an additional method, allowing imaging the individual layers. Imaging is mainly used To clarify the pathology of the upper jaw and TMJ studies.

Stratified study with a small angle (8-10°), or sonography, is a combination of x-ray picture and CT scan. The image of the object is more clear and contrasting.

Panoramic radiography is a type of layer-by-layer image.

The practical application of panoramic radiography in dentistry began in 1949 p. Panoramic radiograph occurs simultaneously image the entire dentition as a functional complex with virtually no angular distortion. However, the image on film is slightly increased, and uneven in the central and lateral parts of the jaws. Also noteworthy is the blurred image of the anterior jaws and the projection on them of the cervical spine.

Panoramic radiography gives a reflection on the upper jaw dental, alveolar and basal arcs; nasal cavity; maxillary sinus; and the zygomatic bones. In the lower jaw – dental, alveolar and basal arcs; the edge of the lower jaw; the branches and angles.

Strait panoramic radiography allows to study:

1. The relationship of the dentition in occlusion, in the mesio-distal direction.
2. The relationship of the dentition in the malocclusion in the vertical direction.
3. The belonging of teeth to temporary or permanent occlusion.
4. The stage of permanent teeth roots formation.
5. The degree of temporary teeth roots resorption.
6. The presence, the stage of formation and position of permanent teeth germs.
7. The ratio of permanent teeth germs and the roots of the temporary teeth.
8. The inclination of the teeth, erupted and impacted teeth relative to adjacent teeth and the mid-sagittal plane.
9. Dent-alveolar relative height in the front and lateral areas of the jaws.
10. The depth of incisal overlap.
11. The body size of the jaws, branches and angles of the mandible.
12. The asymmetry of the right and left halves of the middle and lower parts of the facial skeleton.
13. The presence and degree of curvature of the nasal septum.
14. The size of the nasal cavity.
15. The magnitude of the nasal cavity.
16. The amount and condition of the paranasal cavities.
17. Shape and location of the congenital clefts of the alveolar process and body of the maxilla.
18. The location of the articular heads temporo-mandibular joint into the joint folds;
19. The location of the hyoid bone.

Research devoted to the bone age study first appeared in pediatrics. One of the first orthodontists, who by attention to the relationship beginning of mineralization sasamoid bone that is in the region of the inter-phalangeal joint of the finger 1 with the period of intensive growth of the skeleton, was T. W. Todd (1937).

The x-ray hand to determine bone age.

Stage 1 – the epiphysis and diaphysis of the proximal phalanx of the 2nd finger foods-scientific dimensions. Chronological age girls and boys – 9 years.

Stage 2 – the epiphysis and diaphysis of the medial phalanx of the 3rd finger however new size. The apogee of the growth will come in 2 years, but the growth of the upper jaw ends, and the bottom continues. The chronological age of the girls is 9 years, 7 months, boys 11 years and 2 months.

Stage 3 – pisiform bone mineralization starts a mineralization of hamate bones. Chronological age of girls is 10 years, 5 months, boys 11 years 9 months.

Stage 4 – there is sesamoid bone ends hamate bone mineralization. Chronological age of girls is 11 years 3 months, boys 12 years 5 months. By Kaminek, for the treatment of malocclusion urgent need to move the lower jaw, because you can skip a good moment, especially for II class on Angle.

Stage 5 – is the peak of pubertal growth, which coincides with the beginning of the menstrual cycle in girls. In the medial phalanx of the 3rd finger the epiphysis is wider than the diaphysis. Chronological age of girls is 12 years, 4 months, boys – 14 years.

Stage 6 – puberty the recession comes growth. The distal phalanx of the 3rd finger is formed: no band gap between the epiphysis and diaphysis. Chronological age of girls was 13 years, 1 month, boys 15 years 4 months.

Stage 7 – there is a connection of epiphysis and diaphysis of the proximal phalanx of the 3rd finger. The peak of growth has passed. Chronological age of girls 14 years 1 month., boys – 16 years.

Stage 8 – there is a connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger. Chronological age of girls 14 years, 3 months, boys – 16 years. At this stage the child is still growing, but growth is slowing, and this should be considered. Kaminek recommends only the inclination or the movement of the teeth, movements of the mandible impossible.

9 stage connection of epiphysis and diaphysis of the radius. This stage indicates the end of the formation of the skeleton. Chronological age of girls is 16 years, 5 months, boys 17 years 3 months. At this stage Kaminek recommends planning complex maxillofacial surgery to be carried out after the formation of the skeleton.

Thus, the carried out radiographic studies help to clarify the diagnosis, to choose a method and make a treatment plan depending on the age of the patient.

Rentgenology the maxillofacial region in children.

In the development of occlusion distinguish three periods: a temporary, mixed and permanent. Spongy substance of jaw bones at birth has a gentle nature; in each jaw 18 follicles (10 temporary and 8 permanent teeth). Because of this the alveolar processes of the upper and lower jaws are the most developed departments.

Radiological picture during the period of temporary occlusion is diverse, polymorphic and changes with age. Radiographs of the tooth follicle are determined in the form of rounded pockets of rarefaction of bone tissue with clear contours, surrounded by the periphery of the cortical bone. Cortical bone of the

bone that surrounds the germ of the future tooth, prior to the mineralization of the crowns has the form of a continuous narrow strip. The contours of the future of the tooth become visible only after the start of the crown mineralization.

Mineralization of the crowns of lateral teeth starts from the tops of casps, and of the cutters with the cutting edge, and on radiographs they look like point pockets of calcification. The number of point pockets of calcification are different. Thus, the cutters usually mentions the existence of 3 centers of calcification in canines – 4 molars and premolars as many of them as tubercles on the chewing surface. Gradually merging into posterior teeth, is determined by the ring phase, then the stage of "cap" or "crock"; on cutters define the contours of the crowns of various sizes.

A baby on radiographs of the jaws is determined by the mineralization of 1/6 of the central incisors crowns, approximately 2/3 of the crowns of the lateral incisors and sometimes calcification in the apex of the canine, the visible calcification of the tubercles of the temporary molars. Sometimes in visible areas of calcification in the area of the first permanent molar and incisor. Noted that the girls teething occurs somewhat earlier than in boys. However, there are individual deviations from the average standards of the eruption. Even fluctuations within 6 months as the norm.

Rickets, chronic dyspepsia, acute infection, endocrine disease, malnutrition, hypovitaminosis, various may affect the timing of mineralization and eruption of teeth. In such cases, x-ray examination to determine the presence or absence of germs, to assess the nature of their formation, taking into account age.

APPLICATIONS OF CONE BEAM COMPUTED TOMOGRAPHY (CBCT)

In orthodontics, CBCT might be used for a variety of reasons. Since the previous edition of these guidelines in 2008, the literature has grown considerably. Establishing the diagnostic efficacy of an imaging technique ideally requires evidence at all levels, starting with technical efficacy (e.g., measurement accuracy, reproduction of detail), diagnostic accuracy (e.g., sensitivity, specificity), impact on treatment planning decisions or patient outcomes and, at the highest level, the cost-effectiveness at the societal level.

It is important to be aware that most knowledge on CBCT relates to the lower levels of diagnostic efficacy. In the absence of comprehensive evidence, this technique should be used cautiously and in carefully selected situations. Cephalometric and panoramic radiographs appear to be sufficient in most circumstances and should not be replaced with CBCT imaging.

USES OF SMALL FIELD OF VIEW (Fov) Cbct

Unerupted maxillary canines. The majority of CBCT examinations of young people are undertaken for localized examination of the anterior maxillary region to assess the position of unerupted canine teeth and suspected root resorption of incisors. There are now a number of retrospective studies comparing orthodontists' decisions made on such clinical cases, with and without the availability of CBCT imaging, which suggest that treatment plans are changed in a minority' of cases. The evidence suggests that clinicians' confidence and consistency in treatment

planning decisions is improved.

There is improved accuracy of localization of unerupted maxillary canine teeth and identification of root resorption in incisor teeth using a three-dimensional imaging technique. In most cases, however, there is agreement between localization and presence of root resorption made using conventional radiographs and CBCT imaging.

Previous UK and European guidelines have suggested that CBCT may be appropriate for the examination of unerupted maxillary canines in selected cases where conventional radiographs fail to provide adequate information. Such an approach seems sensible. For example, conventional radiographs may show root resorption of an incisor tooth with sufficient detail to allow a treatment plan to be devised. CBCT could then be reserved for equivocal cases or those with potential complications.

Other uses of small FOV CBCT

Other localized uses of small FOV CBCT can be considered, such as assessment of unerupted dilacerated incisor teeth, as this view can provide an accurate measurement of the angulation of the dilacerated which might assist in treatment planning.

Surgical planning may also benefit from three-dimensional information. An example is where unerupted teeth or supernumerary teeth are to be surgically removed, but when: they are located in the region of important anatomical structures. If the neurovascular structures cannot be shown to be at a safe distance from the area of surgery on conventional radiographs, then localized small FOV CBCT would be justified.

The use of CBCT for the assessment of cleft palate can be justified where CT scans have been used in the past, as small/medium FOV CBCT is likely to have a lower radiation dose. As described in a recent review, CBCT can allow quantification of the bone defect volume in the context of grafting, as well as localization of ectopic teeth which may be associated with clefts.

A chance to study the skull structure appeared with introduction of roentgenologic researches and method of cephalometric.

Cephalometry

Cephalometric or survey in the distance have given a possibility to decrease or take to the minimum twisting distortions of a photographed object. Under the term «cephalometric» we understand conducting a research at large focal distance that provides the minimum distortions of sizes of explored organ.

Craniometry:

Determination of jaws location – the main aim of craniometric researches is in relation to the plane of frontal part of the skull basis, i.e. determination faces type and determination of deviations from middle sizes that are characteristic for a normal bite to the same type of face.

Craniometry helps to define:

1) Location of jaws, i.e. gnathic parts of facial skeleton in sagittal and vertical directions in their relation to the plane of frontal part of skull basis:

1) in sagittal direction: anterior, middle or posterior location of gnathic part;
2) in vertical direction: inclination of gnathic part upward, middle location and downward inclination;

2) Location of TMG in relation to basis of skull the plane;

3) Length of frontal cranial fossae on which in the process of gnathometric research it is possible to define the individual norm of length of jaws bodies and existing deformation of sizes.

The innate variants of jaws location – we define according to the sizes of angles:

1 Facial.

2 Inclinal.

3 Horizontal.

1. Facial angle (F). We get it at crossing lines of N-Se and N-A (internal lower angle). The average size of facial angle is within the limits of $85 \pm 5^\circ$. His size characterizes the location of maxilla in relation to the skull basis: middle, displaced a little ahead in comparison with a face average (such location of jaws by Schwarz named “ante-position”), displaced a little back in comparison with a face average (this location of jaws Schwarz as named “retro-position”).

2. Inclinal angle (I). It is created by of crossing of lines Pn and SpP (internal upper angle). The average size is $85 \pm 5^\circ$. If angle I is more than average, then the jaws are inclined ahead more than at an average face, that was the author named “anteinclination”, if it is less, then jaws more inclined to back, this position is coned “retroinclination”.

3. Angle of horizontal line (H) is created by crossing of lines H and Pn (internal upper angle). It determines the position of lower jaw head in relation to basis of skull that influences on the shape of face profile. In average this angle is 90° . According to Schwarz, there is interdependence of depth of middle cranial fossae and location of TMJ. The flatter the fossa is, the higher joints are, and vice versa.

With the change of orbital point (Or) location and arthral heads inclination plane H and size of H-Pn angle changes. If angle H is less then average, arthral heads are in position of “supraposition”, closer to basis of skull, if it is more there, arthral heads are in position of “infraposition”, below skull basis, than at an “average face”. Inclination H plane combines with the change of outlines of face profile. At supraposition of arthral heads and normal development of lower jaw chin is displaced to the back, at infraposition – ahead. That is why supraposition of arthral heads influences on the form of jaw type, as retroinclination, and infraposition – as anteinclination of jaws.

As the form of lower jaw is concerned, here can be observed smoothing of chin location due to the change of growth of lower jaw ramus in length, changes of length of lower jaw base and size of its angles. The change of lower jaw form can hide the high or low location of TMJ that is defined by gnathometry.

Gnathometry:

On the basis of data analysis of gnathometry it is possible:

- 1 To define the anomalies of the dento-facial system, which developed as a result of disparity of jaws sizes (lengths of jaws body, height of lower jaw ramus), anomaly of teeth position and alveolar process shape;
- 2 To find out influence of sizes and location of jaws, as well as anomalies of teeth position on the shape of face profile;
- 3 To define the degree of occlusal plane inclination to the plane of skull basis, that it is important for the aesthetically beautiful prognosis of treatment.

For the conduction of gnathometryc analysis we use the following parameters:

1. Angle of Pn-OcP – (internal upper angle). By orientation on the position let 1st and 6th tooth (changeable bite) the average size of this angles more than by the orientation on the position of the 1st and 7th tooth (permanent bite). We choose the distal cusps of the last masticatory teeth located at central occlusion of a bite. If angles less than middle, then an occlusal plane is more up inclined in relation to skull basis, than at an “average face”, and it influences on the aesthetically beautiful prognosis of treatment of sagittal anomalies of bite. In particular, by treatment of distal bite, when the angle of occlusal planes less than 75°, the displacement of lower jaw ahead is not very effective. It is due to the fact, that the chin is displaced ahead insufficient in relation to the line Pn. If angle is more than average, after treatment of distal or a mesial bite we can expect improvement of face profile;

a) Angle of SpP-OcP. During the orientation at teeth 1-6 it is less, than during the orientation on 1-7 teeth. This angle reflects the vertical location of frontal and lateral teeth.

b) Angle of OcP-MP. By orientation on teeth 1-6, it is more than during the orientation at teeth 1-7.

2. Angle of Pn-MP is an internal upper angle. In average this angle is 65°. The size of this angle changes as a result of ante- and retroinclination of jaws, infra- and suprapositions of lower jaw arthral heads, and also at the anomalies of position or lower jaw development. By comparison of the craniometryc and gnathometryc measuring it is possible to determine the reason of this angle size changing.

3. A basal angle (B) is an angle of basis of jaws slope one to another (SpP-MP). Its characterized vertical position of jaws. It size is conditioned by the height of lateral teeth and size of mandibular angles. If this angle is more than average, the lateral areas of jaws are shortened, and the front ones are usually prolonged; the chin is displaced to the back, if this angle is less than average, there is an opposite correlation. The average size of angle is $20 \pm 5^\circ$.

4. Mandibular angle (G) is measured between the lines MT-1 and MT-2, e.g. by tangent to the lower edge of body of lower jaw and back surface of its branches. Its average size is $123 \pm 10^\circ$.

5. Angles of teeth inclination to maxilla to the plane SpP:

1|1 – Sp – 70°,

3|3 – Sp – 80°

4|4 - Sp – 90°.

The increasing of these angles sizes is marked at retrusion of upper incisors. It is characteristic for a mesial bite, underdevelopment of maxilla frontal area (shortening of frontal length, palatal position of incisors), and also at the cleft of maxilla. Diminishing of angles sizes is observed at the protrusion of upper incisors.

We distinguish 4 degrees of upper incisors protrusion by Horoshilkina (1976):

1 degree: is size of angle **1|1** – Sp – 56 – 61°;

2 degree – 51 – 56°;

3 degree – 46 – 51°;

4 degree – 41 – 46°.

6. Angles of teeth inclination to lower jaw to the plane MP.

1|1 – MP – 85°,

3|3 – MP – 90°.

At the distal bite change of incisors inclination to the plane MP is poorly expressed. At a mesial bite the average size of this angle can increase.

6. Inter-incisors angle (I - i) this angle is created by the longitudinal axes of central incisors of upper and lower jaw. The average size is 120-140°.

The size of basal angle influences on the relation of incisors (B). If size of basal angle is 40°, then lower incisors seem to be inclined forward, an inter-incisors angle diminishes to 120° and there is an impression of protrusion. Such protrusion Schwarz called a false one, when not only the relation of upper and lower incisors is changed but also their inclination to the plane of basis of jaws. The sagittal anomalies of bite are sometimes combined with pathology of vertical plane (by the open bite) and large size of basal angle B that can be conditioned by the genetic features of development. In such cases prognosis of apparatus treatment is unfavorable.

At the protrusion of upper incisors in connection with distal position of lower jaw (prognathic distal bite) the inter-incisors angle diminishes, and at mesial bite – it increases.

7. Angle of MM. The important value at cephalometric research has the angle of MM that is created by crossing of lines APg – SpP. When measuring this angle, it is possible to define the location of chin in relation to the apical base of maxilla (point A). Line APg characterizes position of the lower jaw body; and the locations of alveolar process is determined by the size of angle AB – SpP. Equality of angles of APg-SpP and AB-SpP testifies to identical position of body and alveolar process of lower jaw in relation to the plane of basis of skull.

At the alveolar form of distal bite the line A – B on cephalometric is behind the line A – Pg. For differential diagnostics of alveolar process development anomalies and anomalies of lower jaw position we use a difference in the size of angles of APg – SpP and AB – SpP.

Study of linear sizes:

1 Determination of length of lower jaw body:

N – Se + 3 mm = average length of lower jaw body, jaw 68 ± 3 mm in a variable bite and 68 ± 6 mm in a permanent bite.

2. Ratio of maxilla basis length toward length of skull front basis is 7:10. Length of maxilla basis is measured from the intersection of perpendicular from a point A to SpP and to the point of PNS.

3. Ratio of lower jaw base length toward length of upper jaw base at orthognathic bite is **3 : 2**.

4. Ratio of lower jaw body length toward length of its ramus is 7:5. Length of lower jaw body is measured from the intersection of perpendicular to the point Pg on the plane of MT-1 (tangent to the body of lower jaw) to the intersection this line with tangent to the back surface of branches.

We measure the height of ramus from point-to-point crossing of MT-1 and MT-2 to point to crossing of MT-2 and plane of H.

The undevelopment of body and ramus of lower jaw in length results the form of lower face part supra position of arthral heads, and overdevelopment – as infraposition of.

5. Determination of width of ramus to lower jaw. For determination of degree of lower jaw ramus development it is necessary to take into account their width. The width of lower jaw ramus by Schwarz is 2/5 to the length of jaw body.

Profilomhetry enables to explore the form of face profile, define and specify the following:

- 1 Influence of craniomhetryc correlations on the form of type of person.
- 2 True face profile.
- 3 Peculiarities jaw profile that violates harmony of face (position of lips, chin, subnasal point, etc.).

At the profilomhetryc analysis of lateral cephalometric by Schwarz suggests to study the form of jaw profile by:

- 1 Position of lips in relation to the lines Pn and Po and to mouth tangent (line T), that connects the skin points of **sn** and **pg**.
- 2 Proportion of the face parts.
- 3 Profile angle T.
- 4 Taking into account the thickness of face soft tissues.

The field of jaw profile after Schwarz (KPF) is between the lines Pn and Po (nasal and orbital planes). In the jaw profile field Schwarz defines three parts of face: frontal (overhead) from the point of trichion (tr) at the edge of hairy part of the head to the point nasion (n) on a skin in the area of nose bridge; nasal or middle – from point nasion (n) to subnasale (sn); jaw (lower) from point subnasale (sn) to gnation (g) on the chin.

Proportion of the face is defined by correlation of its jaw and nasal parts (comparison in relation to nasal or middle), and also by width of biometrical profile field (a middle size is 15 mm). Jaw part can be a little bit more or less nasal one (within the limits of 10%).

Positions of lips determine according their attitude toward the line T – mouth tangent, which connects the skinning points of sn – pg. If this line divides the red

framing of upper lip in half and runs into the external surface of the red framing of lower lip, positions of lips are called middle. If one or both lips are situated in one plane midposition, such position is called positive, if after the plane negative.

Position of lips in relation to the nasal plane, of Drejfus (Pn). In a norm the upper lip touches the line Pn, the lower lip doesn't touch line Pn (it lacks 2-3 mm) and the chin is between the lines Pn and Po.

Position of lips in relation to the nasal plane of Drejfus (Pn). In a norm the upper lip touches the line Pn, the lower will lip doesn't touch line Pn (it lacks 2-3 mm) and the chin is between the lines Pn and Po.

The intersection of Line Pn and Po forms the angle T that is called profile angle. Its average size is 10° . At such size of angle T profile is ideal in the aesthetically beautiful relation according to Schwarz and is named straight. At the size of profile angle more than 10° the type of profile is named sloped back, less than 10° – sloped forward.

At small variability of sizes T angle harmony face features is violated insignificantly, but its expression changes. The increase of profile angle gives the face the tenderness, and decrease expression of energy and courage.

The size of profile angle T characterizes position of the chin in relation to subnasal point (sn) and determines the form of jaw profile, and consequently matters at planning of treatment at sagittal anomalies of bite.

The form of profile depends on the thickness of soft tissues. In the region (n – N) it is 6 mm in the average (true for a child and an adult), and in the region of sn – A – for children its size is 12-14 mm, and for adults – 15-17 mm, i.e. the considerable increase of thickness is observed.

At the location of sn at the front mark Pn the distance is marked with a sign plus (+), at the location behind with minus (-). The thickness of soft fabrics in the region of point of pogonion (pg) matters too.

The location of lips, influences on the form of profile. A lip angle is created by the tangent connecting the most protruding points of lips with a nasal line. If this angle equals zero, both lips are on the same level, if it is situated to the left of nasal line it is considered negative, if situated to the right – positive.

The form forehead influences also the form of profile (vertical, protuberant or flat). The form of forehead matters for estimation of length of front basis of skull. As we know, the distance N – Se grows up to the age of 9 in average according to Schwarz it makes 70 mm, for boys of 13 years – 73 mm, for girls of 13 years – 67 mm.

On the basis of cephalometric research information by Schwarz came to the conclusion, that it is possible to define, what is according kind of face profile is typical for, that is typical for this individual in accordance with skull formation.

If a patient has the size of angles **I and H** is more or less than average, then the difference between the average size of these angles and that is of a patient is added to the average size of profile angle **T**.

$T = 10 + (I_i - I_n) + (H_i - H_n)$, where **I_i** is the size of patient inclination angle *a*; **I_n** is the normal size of angle of inclination; **H_i** is the size of angle of horizontal line at a patient; **H_n** is the normal size of angle of horizontal line.

Strait cephalometric.

In addition of cephalometric study of the skull in lateral projection study it also in frontal and axial projections. Such research is used to study the growth of the facial skull in the transverse direction and the detection asymmetries and the presence of pathology in the transversal plane. Especially valuable this method is for cross-bite, over the lateral displacement of the lower jaw and the uneven growth of the right and left halves of the face.

For orthodontic treatment of patients with a significant degree of the upper dentition and apical base narrowing, curvature of the nasal septum and volume reduction of the nasal cavity using the method of accelerated disclosure of palatal suture by Derichsweiler, the analysis of direct cephalometric of the skull allows to estimate changes of the not only of the maxillary bones location, but other bones of the facial skeleton. Strait projection is used for determining the indications for reconstructive surgical interventions in the maxillofacial region.

The basis of the study purpose is the recognition of asymmetry, due to uneven development of facial skeleton both halves or its individual parts.

The main line used the mid-sagittal line of the skull. Wustrow suggested to connect both tragus and in the middle of the line drop the perpendicular TME (Tragus-Mitten-Ebene). In addition to this cranial median Gerlach suggested using the front median GM through the points nasion and spalnu that for the symmetric structure of the face and dental arches takes place between the upper central incisors and through the median point of the chin.

In the process of studying direct cephalometric Chairman marks such laterally located point: Lo, T, Or, W, Co, Fe, Mx, Go, the points on the chewing surfaces of the first permanent molars.

In addition to medium- sagittal line, horizontal hold, connecting the same dots with the lines: Lo-Lo, (the intersection of the oblique orbital lines with the outer edge of the lateral wall of the orbit); T-T – the point on the pyramid of the temporal bone; Or-Or – point on the lower edge of the orbit; W-W – lower point of the mastoid; Co-Co – lateral point of the articular heads on zygomaticus arcs; Zj-Zj – lateral point on zygomaticus arcs; Mx-Mx – mesial points on the outer contour of the alveolar process of the maxilla; Go-Go – the corner points of the lower jaw, and others. Indicate also the median points: nasion, spinal, chins. enter-incisors on the upper jaw and connect with them the same name lateral points. Drawings, naso-orbital, orbital, spinal and other triangles allow visualizing and exploring symmetry and asymmetry in development of the face. To study the asymmetry of both halves of the face is carried out with laterally spaced points of the perpendiculars at the mid-sagittal line, and map the location of the points on the right and left sides.

H. A. Rabuka and co-authors proposed a vertical plane of symmetry for the basis of cockscomb point nasion, anterior nasal protrusion and a horizontal line

through the point Lat. The point of intersection of these planes is adopted by the authors for middle point of linear values.

Materials for self-control:

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

1. Write down in album the scheme of methods of diagnostics according to certain type of malocclusion and age.

B. Tasks for self-control:

1. "Dental age" can be determined as?

- a) type of child's development
- b) the sex of the child the number of temporary teeth
- c) status of root resorption of deciduous teeth
- d) the middle part and two semi-circular bending
- e) status of crowns resorption of deciduous teeth

2. The first clinical functional test by Ilyina-Markosyan is?

- a) the study of a face at physiological rest
- b) the study of the habitual occlusion of the jaws
- c) the study of lateral displacements of the mandible
- d) comparative study of the habitual and central occlusion
- e) the study of tmj' x-ray of open and deep bite

3. Normal or simple lip frenulum must be located at such distance from the gingival margin?

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

4. According clinical examination we define the following parts of the diagnosis

- a) morphological, etiological and aesthetic
- b) morphological
- c) aesthetic
- d) functional
- e) etiological

5. What method is used to determine the width of the dentition?

- a) Pont
- b) Korkhaus
- c) Tonn
- d) Gerlach
- e) Howes

6. What method is used to determine the length of the front part of the dentition?

- a) Korkhaus
- b) Pont
- c) Tonn
- d) Gerlach
- e) Hawley

7. Length of the front part of the lower jaw in orthognathic bite more on:

- a) 2 mm
- b) 3 mm
- c) 4 mm
- d) 5 mm
- e) 8 mm

8. The proportionality of size of the upper and lower incisors in normal overbite is determined by?

- a) Tonn
- b) Gerlach
- c) Pont
- d) Korkhaus
- e) Howes

9. The fourth clinical functional test by Ilyina-Markosyan is?

- a) comparative study of the habitual and central occlusion
- b) the study of TMJ' X-ray of open and deep bite
- c) the study of a face at physiological rest
- d) the study of the habitual occlusion of the jaws
- e) the study of lateral displacements of the mandible

10. To determine the correct form of the dentition we build a diagram according to the method of?

- a) Hawley-Herber-Herbst
- b) Howes –Snagina
- c) Tonn-Gerlach
- d) Nance-Korkhaus
- e) Howes

11. Diagnostic clinical test by Eshler-Bitner is used for?

- a) differential diagnosis of various forms of distal occlusion
- b) differential diagnosis of displacement of the lower jaw
- c) differential diagnosis of various forms of mesial occlusion
- d) diagnosis of disorders of the maxillofacial region
- e) differential diagnosis of the varieties deep bite

13. Radiography of palatal suture prescribed for such orthodontic pathology?

- a) diastema
- b) anomalies of position of individual teeth
- c) malocclusion in the sagittal plane
- d) malocclusion in the vertical plane
- e) malocclusion in transversal plane

14. Indications for X-ray of the TMJ is?

- a) the presence of complaints related to TMJ, malocclusion associated with the displacement of the lower jaw
- b) anomalies of position of individual teeth
- c) diastema
- d) spacing
- e) rotation

15. "Bone age" is determined by?

- a) X-ray of the wrist
- b) contact internally oral radiogram
- c) panoramic radiogram
- d) occlusal radiogram
- e) frontal cephalometrics

16. Panoramic X-ray shows?

- a) dental arches, nasal cavity, maxillary sinuses, TMJ heads
- b) cervical spine
- c) bone age
- d) the frontal sinuses
- e) biological age.

17. Physiological root resorption occurs in such cases?

- a) in milky teeth during physiological change
- b) chronic periodontitis
- c) osteomyelitis
- d) abscess
- e) cysts

18. There are the following types of physiological root resorption?

- a) even, uneven, at the bifurcation
- b) idiopathic
- c) physiological
- d) pathological
- e) microbiological

19. Tight closing of the lips is clinically defined by symptom?

- a) "Thimble or lemon crest"
- b) adenoid face
- c) mesial step
- d) heart symptom
- e) distal step

20. Masticatiography is a method of registration?

- a) movements of the lower jaw
- b) TMJ
- c) biopotentials of muscles
- d) muscle tone
- e) occlusal plane

21. Myotonometry is a method of definition?

- a) muscle tone
- b) biopotentials of muscles
- c) movements of the lower jaw
- d) movements of the TMJ
- e) occlusal plane

22. Electromyography is a method of definition?

- a) biopotentials of muscles
- b) muscle tone
- c) movements of the lower jaw
- d) movements of the TMJ
- e) occlusal plane

23. To determine the type of swallowing function in the clinic is used a test?

- a) with a sip of water
- b) with cotton fibrils
- c) with nuts
- d) with toast
- e) with ruler

24. The lateral cephalometric is indicated for malocclusions in such planes?

- a) sagittal and vertical
- b) sagittal and transversal
- c) sagittal and occlusal
- d) sagittal and Frankfurt
- e) transversal

25. The increasing of the facial angle (F) by Schwartz is called?

- a) anteposition

- b) retroposition
- c) middle position
- d) infroposition
- e) supraposition

26. The decreasing of the facial angle (F) by Schwartz is called?

- a) displacement of the upper jaw backward
- b) displacement of the upper jaw forward
- c) displacement of the upper jaw side
- d) move the upper jaw down
- e) displacement of the upper jaw upwards

27. The size of the basal angle (B) is?

- a) the angle between the bases of the jaws
- b) the angle of inclination of the maxilla base to the cranial plane
- c) the angle of inclination of the mandible to the nasal plane
- d) the angle of inclination of upper jaw to occlusion plane
- e) the angle of inclination of the mandible to occlusion plane

28. Clinical functional tests by Ilyina-Markosyan apply to?

- a) differential diagnosis of displacement of the lower jaw in transversal plane
- b) differential diagnosis of various forms of distal occlusion
- c) differential diagnosis of various forms of deep occlusion
- d) diagnosis of disorders of the maxillofacial region
- e) the differential diagnosis of the varieties open bite

29. At what value of angle T profile according to Schwartz is considered ideal?

- a) 10
- b) 5
- c) 15
- d) 20
- e) 25

30. Using the Izard index (IFM) we determine?

- a) the shape of the face
- b) the length of the face
- c) the profile of the person
- d) facial symmetry
- e) proportionality of the face

31. Frontal cephalometrics indicated for the study?

- a) facial growth in transversal direction
- b) the location of the TMJ in relation to the plane of the skull base
- c) length of anterior cranial fossa

- d) the location of the jaws relative to the skull base in the sagittal direction
- e) influence of craniometric ratios on the profile type

32. The study of parafunction of orbicular oris muscles is possible when you study?

- a) patient face while talking with him
- b) photos of the patient face and profile
- c) diagnostic models of the jaws
- d) orthopantomogram
- e) cephalometrics

33. Biometric studies are made on?

- a) models of the jaws
- b) cephalogram
- c) orthopantomogram
- d) the patient's face
- e) radiograph of the bones of the hand

34. The study of the typical position of the lips during orthognathic and sagittal malocclusions helps to determine?

- a) profile configuration that can be achieved as a result of treatment
- b) the tone of the circular muscles of the mouth
- c) violation of chewing function
- d) inflammatory diseases of the red lip line
- e) fungal diseases of the corners of the mouth

35. Bruxism is a symptom of?

- a) increased tone of muscle, that raising lower jaw
- b) reduced tone of muscle, that raising lower jaw
- c) increased tone of muscles, that lowering the lower jaw
- d) reduced tone of the muscles that lowering the mandible
- e) increased tone of the facial muscles

36. The ratio of the sizes of segments of dental arches was determined by?

- a) Gerlach
- b) Tonn
- c) Howes
- d) Korkhaus
- e) Ponn.

37. The second clinical functional test by Ilyina-Markosyan is?

- a) the study of the habitual occlusion of the jaws
- b) the study of a face at physiological rest
- c) the study of lateral displacements of the mandible

- d) comparative study of the habitual and central occlusion
- e) the study of TMJ' X-ray of open and deep bite

38. The third clinical functional test by Ilyina-Markosyan is?

- a) the study of lateral displacements of the mandible
- b) comparative study of the habitual and central occlusion
- c) the study of TMJ' X-ray of open and deep bite
- d) the study of a face at physiological rest
- e) the study of the habitual occlusion of the jaws

39. In the study of the TMJ heads extrusion is used the method?

- a) palpation
- b) auscultation
- c) percussion
- d) sensing
- e) visual observation

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