

**MINISTRY OF HEALTH OF THE REPUBLIC OF UZBEKISTAN
TASHKENT STATE DENTAL INSTITUTE**

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**ANTHROPOMETRIC INDICATORS OF REPRESENTATIVES OF THE
UZBEK POPULATION
(MONOGRAPH)**

Ташкент – 2024

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**ANTHROPOMETRIC INDICATORS OF REPRESENTATIVES OF THE
UZBEK POPULATION**

(MONOGRAPH)

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The monograph is based on the analysis of its own research results, the cephalometric method of measuring the structure of the face and bite has been studied.

The monograph is intended for dentists and specialists dealing with this problem, as well as for orthodontists.

INTRODUCTION

Currently, despite the introduction of modern methods of diagnosis and treatment of congenital anomalies and deformities of the maxillofacial region into practical medicine, these disorders not only affect the patient's behavior, aesthetics of appearance, but also cause shifts in the neuropsychic status and lead to the development of diseases of the digestive system. According to WHO, anomalies of the maxillofacial region in the USA occur in 65% of cases, in European countries - 59.4%, in various regions of Russia they occur with a frequency of 30.9 to 76.5%, and in Uzbekistan they are observed in 62%. An urgent problem of modern dentistry is the improvement of methods for the diagnosis and treatment of anomalies and deformations of the maxillofacial region, as well as the study of anthropometric and cephalometric parameters of various ethnic groups of the population.

Over the years of independence, the healthcare sector in our republic has undergone significant changes. The introduction of early diagnosis and treatment of congenital and acquired abnormalities of the maxillofacial region into practical medicine has led to an improvement in facial appearance among various population groups, a decrease in diseases of the respiratory, digestive and neuropsychiatric systems. As a result of the large-scale activities carried out to study the pathogenesis, the introduction of early diagnosis methods into practice and the development of modern methods for the treatment of anomalies and deformities of the maxillofacial region, the incidence of complications due to this disease decreased from 37 to 7%. Currently, according to the Action Strategy for the five priority areas of development of the Republic of Uzbekistan in 2017-2021, the primary tasks for further improvement of medical care provided to the population of the country are timely prevention and diagnosis, provision of highly qualified, high-quality medical care, including patients with anomalies and deformities of the maxillofacial region through the use of modern technologies, this will improve the quality of life of various segments of the population .

To increase the effectiveness of early diagnosis and treatment of congenital and acquired anomalies and deformations of the maxillofacial region, a wide range of scientific research is carried out in the world, in particular, clinical diagnosis, proof of the causes of congenital and acquired deformations of the maxillofacial region becomes particularly important; substantiation of the mechanism of development of changes in subsequently congenital anomalies and deformations of the maxillofacial region; development of criteria for the diagnosis and treatment of congenital and acquired anomalies and deformities of the maxillofacial region; development of anthropometric and cephalometric indicators for various ethnic groups; development of standards for early diagnosis and treatment of this pathology; selection of standards for the treatment of patients, prevention of relapses and the introduction of modern methods to prevent secondary deformities of the maxillofacial region.

This dissertation research to a certain extent serves to solve the tasks provided for by the Strategy of Action on five priority areas of development of the Republic of Uzbekistan in 2017-2021, resolutions of the President of the Republic of Uzbekistan "On measures to further deepen the reform of the healthcare system" dated November 28, 2011 No. PP-1652, "On measures for the further development of specialized medical care to the population of the Republic of Uzbekistan for 2017-2021" dated June 20, 2017 No. 3071, as well as other regulatory documents adopted in this field of medical science.

Normal bite, ethnic aspects

There are many options for classifying the position of teeth and bite in individual individuals, which allow us to identify the limits of fluctuations in the norm, make it possible to differentially determine the norm and pathology, create a scientific basis for the treatment of various deviations, malocclusion and deformities of the maxillofacial region.

It is customary to consider orthognathic bite as an anatomical and functional norm. When teeth are lost, problems arise in restoring bite, since there are no options for combining the parameters and proportions of dental arches, as well as

the size of the head, face shape and jaws of representatives of certain ethnic groups.

Modern requirements of science and practice do not include bite assessment when planning treatment, but use only the nature of the closure of the dentition.

In maxillofacial surgery, orthodontics, orthopedic dentistry in the restoration of teeth, dentition, lost bite and face shape, as well as in forensic medical practice for identification, it is important to know the size of the dental arches of orthognathic bite in proportion to the hierarchical relationship with angular and linear parameters, the position of the jaws, face and head, which are determined during human life, in a naturally voluminous arrangement of all structures.

In 1842, G. Carabelli carried out a systematization of the ratio of dentition when closing the jaws, determined the size of the normal bite (mordexnormal). Further, N. Sternfeld (1902) established the difference between physiological (ethnological) and pathological bites depending on the closure of teeth. The author attributed the orthognathic bite to normal. With an orthognathic bite, the upper front teeth are in an upright position, and the lower front teeth are in an inclined position, when they close, they come into contact with the lingual surfaces of the upper teeth. In modern dentistry and morphology, several formulations of occlusion have developed. E. I. Gavrilov, I. M. Oxman (1978) define occlusion as "the nature of the closure of the dentition in the central occlusion." The most complete definition of occlusion, in our opinion, was given by L. S. Persin "occlusion – multiple closure of the dentition in the usual position of the lower jaw". The author considers the most important and the first sign of an occlusion to be multiple closure of the dentition. There is no occlusion if there is no closure of the dentition. L. S. Persin believed that the concept of physiological occlusion and physiological occlusion are one. "The bite of the dentition is determined at the central or habitual position of the lower jaw. With the physiological closure of the dentition, the central position of the lower jaw and its habitual position coincide."

V. N. Trezubov (1998), in addition to closure, identifies a number of other signs of bite: 1 - when the dentition of the upper jaw overlaps the dentition of the

lower jaw in the area of the lateral teeth with buccal bumps, and in the frontal area the overlap of the upper teeth of the lower teeth occurs 1/3 of the height of the crown; 2 – each tooth has two antagonists, not counting the central ones lower incisors and upper third molars; 3 - the median line coincides between the central incisors of the upper and lower jaw; 4 – starting from the central incisors to the molars, the height of the crowns decreases; 5 - both on the right and on the left, when closing, there is multiple fissure-tubercle contact of teeth; 6 - Engl occlusion on the right and left sides it has a first class. All these signs (excluding the first one) characterize the types of physiological bite.

The authors' publications provide data on the frequency of occurrence of certain types of bite among representatives of different ethnic groups.

It is known that due to the loss of teeth due to various natural and artificial changes in the jaw apparatus, the bite may change.

E. Angle (1889) believed that the correct ratio of dentitions is probably influenced by the sixth upper teeth, which erupt first, they are characterized by a constant localization, while at the base of the facial skull they occupy a stable position. The classification proposed by E. Angle is based on mesio-distal ratios of dentition. Since bite is a functional concept, according to Y.M. Malygin [51 p.17], it "cannot deform, since it has no shape." The bite is formed by morphological structures, dentitions and their constituent teeth. Teeth are characterized by both age and gender, as well as racial, ethnic and individual characteristics. Tables based on the size of the parameters of teeth, dentition and their indices are calculated for Caucasians, while ethno-territorial and other differences are not always taken into account.

Many researchers have pointed out the variability of the measuring and relief features of teeth and dentition.

O. D. Baidik notes that Mongoloids are characterized by a tendency to macrodontism (large teeth). Later, this position was confirmed in the studies of T. I. Sanzhitsyrenova, A. A. Anikienko, who studied the sizes of teeth, dentitions, apical bases in such peoples as the Teleutes, northern Khakas, Chulym Turks,

Buryats and Nanais. Macrodonia was considered by some authors as a pathogenetic factor of dental anomalies, while others as an ethnic norm. Thus, E. H. Abdrazakov, V. S. Korsakov, S. R. Ruzutdinov believe that each ethnic group should have its own norm of tooth size, shape and size of dentition, jaws and skull as a whole.

O. D. Baidik and T. I. Sanzhitsyrenova believed that the indices of dentition characteristic of Caucasians developed by Pon and Linder-Hart at the turn of the XIX and XX centuries could lead to errors in the diagnosis of dentition anomalies in Mongoloids, including Buryats. A number of representatives of the Mongoloid race: Khants, Buryats, Eskimos, Mongols, Kazakhs, Yakuts, etc., have wide sizes of dental and alveolar arches. There are no data on the features of the biometric characteristics of the dental system and morphology in persons of Uzbek nationality.

Orthodontic treatment consists of various stages with unique characteristics and challenges. The orthodontic phase of the "finish" is characterized by many details necessary to achieve a good result. In some cases, the finishing phase is very difficult and requires the creation of complex biomechanical forces to achieve a satisfactory orthodontic solution. A high percentage of these difficulties associated with the finishing phase arise from the discrepancy in the size of the teeth, which could be detected and taken into account during the initial diagnosis and treatment planning. A study by Brazilian authors Araujo E., Souki M. (2003) aimed to investigate the correlation between the mismatch in the size of the front teeth and anomalies of the dentition in classes I, II and III according to Angle, their prevalence in the Brazilian population from Belo Horizonte. The authors estimated the width of the mesiodistal dimensions of six front teeth in 300 randomly selected patients. The patients were divided into three groups depending on the type of anomaly. The important conclusions of this study are as follows: 1. Persons with occlusion anomalies in class I and III demonstrate a significantly higher prevalence of tooth size inconsistencies than in people with class II anomalies; the prevalence

of subjects with class III anomalies and anterior tooth relationship inconsistency was significantly higher than in subjects with anomalies in classes I and II.

The Pakistani authors studied the possibility of using the Ponta index in assessing the width of the upper jaw depending on the sum of the mesiodistal dimensions of the maxillary incisors. 150 patients were examined in Karachi, measurements were carried out on the upper jaw using a digital vernier caliper. In the course of the study, the authors concluded that low correlations between observed and predicted dental arch widths according to Pont would not be clinically informative for predicting the width of dental arches.

The orthodontic ethnic features in 90 patients of Malay, Chinese and Indian groups were cited by Malaysian scientists. When comparing the Bolton values of the general and anterior ratio, which was measured with a digital vernier caliper, the results were evaluated using the Hamoth Arch Tooth System software, with an accuracy of 0.01 mm. The average values of the coefficients were calculated using Bolton analysis. Significant differences between Malays and Chinese have been revealed. The authors suggest that specific clinical assessments require standards specific to these ethnic groups.

Kristina L. and co-author. (2009) consider conducting proper comprehensive orthodontic treatment to obtain optimal final occlusion, with acceptable overbite and overjet, and aim to establish the relationship between the general and anterior Bolton ratios, the ratio between the first molars, in accordance with Engle's classification, and the dimensions of the sagittal (overjet) and vertical (overbite) relationships of incisors. The authors conclude that an important factor hindering the achievement of the goal is the mismatch of the mesiodistal sizes of the teeth of the upper and lower jaw, which is confirmed by the presence of correlations between the studied parameters. The assessment of the relationship of teeth according to Bolton is of important diagnostic importance, which must be taken into account when planning orthodontic treatment.

C. T. Yolanda et al. (2013) proves that the parameters of dentition are of important diagnostic importance for predicting the correct size of dental arches and

suggest taking this fact into account when choosing the most optimal treatment plan for each patient. According to the authors, the lack of coincidence of the proposed values of the Pont indices is due to the fact that the size of the dental arches of the Mexican population is wider than suggested by Pont. This reflects the need to develop an index with characteristics that will be appropriate for the population where it will be applied. It is important to remember that racial variations also exist in teeth, so the Pont analysis can be considered a guideline for follow-up and control of the transverse size of the dental arch, but taking into account the ethnic characteristics for each group (mainly in mixed bites).

However, a study by other authors (Ahmet A. C. et al., 2012], when studying the assessment of the Pont index for the Turkish population when comparing the results obtained with data from studies of various ethnic groups, came to a different conclusion that the Pont index should not be used to determine the width of dental arches for Turkish patients when planning orthodontic treatment.

Korean scientists in their article report on a study to determine the average size of teeth in Koreans with normal occlusion. The average ratios between the upper teeth were calculated, which could ensure proper overbite, overjet and good dental closure. 43 male and 51 female adult patients of Korean nationality were examined. It was found that the average tooth size of Korean adult men with normal occlusion was significantly larger than that of Korean adult women, except for the upper and lower first molars ($p < 0.05$). A positive correlation was observed between the sum of the lower anterior incisors and the sum of the unilateral canines and premolars in each jaw. Based on this correlation, a regression equation was obtained that could predict the sum of uncut unilateral canines and premolars in a mixed bite.

Another group of Korean scientists conducted a study to determine the norm of tooth size and dental arch parameters of Koreans with normal bite. The mesiodistal diameters of the teeth, the width of the dental arch and the length of the dental arch were measured with a digital electronic vernier caliper (with an

accuracy of 0.01 mm) and the Bolton indices as well as the jaw-to-jaw ratios of the width of the dental arches were calculated. The resulting changes showed clear differences between the sexes, the estimated indices and jaw ratios were the same. As a result, the data obtained were compared with previous data to determine the changes that appeared over time. The clinical results of the present findings were also discussed. Biometric data provides diagnostic criteria for Korean patients with malocclusion.

Epidemiological studies of occlusion and malocclusion are not only an aid in planning orthodontic treatment and assessing dental health, but also offer a valid research tool for determining various natures and genetic factors in etiology.

The aim of the authors of the article (Hassan R. Rahimah A., 2007) was to provide an overview of occlusion, malocclusion and various methods of measuring occlusion. Each index and its evaluation method is based on the opinion of an individual or a group of individuals. It was found out that there is no specific index or method that really includes all the occlusive criteria. Therefore, indexes or methods have been developed according to different requirements, and can be used to collect information according to a specific study.

The literature information regarding the shape of dental arches is very contradictory. Since Muehlreiter (1889), it has been considered ellipsoid for the upper jaw with a normal dental arch shape, and paraboloid for the lower jaw.

B. S. Zanina-Pokrovskaya (1973) studied the alveolar arches of the jaws in different ethnic groups. She identified the shapes: ellipsoid, paraboloid, trapezoidal, U-shaped, hyperparaboloid and quadrangular. As the author noted, each of these forms is observed with different frequency. The upper alveolar arch is very variable in all ethnic groups, both in men and women. The most common are paraboloid, ellipsoid and U-shaped shapes, less often hyperparaboloid and trapezoidal. According to various researchers, an ellipsoid arc is found on male turtles from 0 in Chukchi, Tungus, Kyrgyz and up to 76.9% in Italians; paraboloid - from 0 (Italians, Papuans, Indians) to 46.66% in Ingush; U-shaped - from 0 (Italians, Mordvins) to 47.62% in peoples Ainu. Trapezoidal shape is noted in all

groups, but rarely, and in Yakuts the frequency of occurrence reaches 29.17%. The hyperparaboloid form is even rarer, with a maximum of 15.39% among Blacks. The quadrangular shape is observed very rarely – a maximum of 9.52% - in the Ainu. The ellipsoid arc is less common in Mongoloid groups than in Caucasoid ones. In the Caucasoid groups, U-shaped and paraboloid shapes are less common than in the Mongoloid groups. The lower jaw is much more stable in shape. The paraboloid shape of the dental arch prevails, and its other variants are less common.

A. A. Zubova (1973) in his observations notes that the most characteristic forms of the upper dental arch for men are angular shapes (trapezoidal and quadrangular), which is clearly associated with the formation and eruption of a large canine.

G. G. Manashev, examining boys and girls in the Krasnoyarsk Territory, noted that the parabolic shape of the upper and lower jaw arch is more common, the U-shaped shape is more often observed in girls.

G. V. Kuznetsova et al. stencils of nine standard sizes were made with an interval of 1 mm to build a normal dental arch. To make stencils, scientists used the Hauley–Gerber-Herbst graphical method as a basis, which is based on the sum of the mesiodistal diameters of incisors and canines. The curve obtained in this way has the shape of an ellipse. But, according to S. I. Khmelevsky (1984), the occurrence of the ellipsoid shape of the upper dental arch and the paraboloid lower one is very small for a modern person, in this regard, the author notes that they cannot be considered typical.

M. L. Jones, S. Richmond, using the computer program of the three-dimensional Reflex Plotter, analyzed plaster models of the jaws and concluded that the ideal shape of the dental arch should be considered a parabola. But the authors conducted the study on a small amount of material — only 28 pairs of plaster models.

The authors from France conducted studies of the dental arch shapes of adult patients with normal occlusions. Six measurements of mandibular dental arches

and five independent coefficients were performed using the k-means clustering method. Based on these ratios and the use of polynomial functions, the shapes of dental arches are determined and a guide with established shapes is developed. Scientists have proved that there are no significant differences between men and women, but the size of women's dental arches is smaller.

The determination of dental arch shapes in 306 volunteers selected from 15,836 young people was performed by a group of authors (Lee et al., 2011). The aim of the study was to develop a new method for classifying the shapes of dental arches in individuals with normal occlusion, to identify the types of shapes for individual groups. In the course of the study, the authors identified 3 types of dental arch shapes, and the cross-classification of the maxillary shape with the lower one showed more frequent differences in diagonal elements than in non-diagonal ones. The three arch shapes showed differences in tooth size, the width of the dental arch, the width of the basal arch, and the slope of the posterior teeth. The authors believe that in order to determine the area difference as distance norms and apply them to the cluster method using medoids, the shape of the dental arch can be classified as a control for extreme values without bias. The scientists hope that their technique will have clinical application in determining and applying specific forms of preformed orthodontic arches.

The reliability and validity of measurements obtained from clinical standardized occlusion photographs, compared with measurements on models, were evaluated by scientists.

In recent decades, the trend of using modern computer technologies in dentistry has increased. A study by the authors (Normando D. et al. 2011) consisted of a sample of 16 patients (8 men and 8 women aged 15-24 years) with permanent bite, without agenesis and/or loss of teeth. The paired t-test and the intra-class correlation coefficient (ICC) were used to verify the validity and reliability. Slight differences (about 2 percent of the average) and excellent ICC (0.75), The authors claim that the developed photogrammetric method has shown

accuracy, reliability and reliability, which is acceptable for clinical and scientific purposes.

A review of the literature on the topic of studying the shape of dental arches was conducted by the authors of Mu Jain, N. Dhakar (2013) and concluded that the efforts of scientists to find a universal ideal shape of the arch were one of the most persistent but difficult tasks pursued by orthodontists. The basic principle of the arch shape in orthodontic treatment is that the original shape of the patient's dental arch should be preserved within reasonable limits. However, these variations in the shape of the arch are not reflected in the preformed orthodontic arches currently available, and it is important to keep this in mind during orthodontic treatment when using them, the shape should be considered the starting point for adjustments necessary for proper individualization. The Pakistani authors report in their publication on the comparative results of dental arches of various vertical shapes of faces in order to choose the most acceptable shape of the dental arch at the intermolar width. A group of people with normal bite was selected. The exclusion criteria were: the presence of dental anomalies, previous dentalveolar surgery, trauma or orthodontic treatment, and craniofacial syndromes. 100 subjects were selected, including 40 normo-divergent, 30 hypo-divergent and 30 hyper-divergent cases. Occlusograms were made and various sizes of arcs were measured. In the course of the study, the authors discovered a non-linear relationship between the length and width of the arc, so scientists argue that guide shapes cannot be applied to specific types of faces.

Khin Myo Thu (2005) assessed the jaw measurements of the dental arch, assessed the validity of the Pon and Korhaus indices, to determine the relationship between the shape of the dental arch of the jaw and the shape of the head, and assessed the cephalic index in a population survey. The cross-sectional study was performed on 85 adult Malaysian students, 28 men (32.98%), 57% women (67.02%) attending a teacher training college. The cephalic index was not significantly different between men and women. The average values of the anterior width of the dental arch, the posterior width of the dental arch and the length of the

dental arch were 35.57 mm, 47.3mm and 18.01 mm, respectively. The data obtained were significantly different from their respective indices. The correlation coefficient between the interstitial width and the anterior width of the dental arch was 0.18 and was not significant in both sexes of Malaysian students.

Thus, as the analysis of the literature available to us has shown, dental arches have a different shape, naturally associated with ethnicity, shape and structure of the entire skull. At the same time, the authors, noting the multifaceted variability of the shape of the jaws, dental arches and the entire skull, provide their data on the variability of tooth sizes, the shape of dentition and arches among representatives of different ethnic groups of the modern population.

The structure and shape of the head and face

S. G. Efimova identified a chronologically traceable trend towards the appearance of neutral forms of the structure and shape of the head and face in some territories of Russia and CIS countries. For example, the zygomatic diameter increases in those groups that were characterized by its small size in the previous period. If previously there were average sizes, then such an increase in the zygomatic diameter is not observed. The increase in the height of the face was noted in parallel with the upper facial index. According to S.G. Efimova, the approach to the neutral variant also occurred in the direction of changing the shape of the skull, and shifts in the shape of the cerebral skull are more pronounced than in the facial region. The author has revealed that there is a different orientation of epochal changes among representatives of different races, associated with an increase in the characteristic features of a race or a racial-ethnic group.

Despite this, many authors noted not only epochal changes in the shape of the head and face on the scale of a race or a large racial and ethnic group, but also the regional variability of small groups of the population.

The territory of Siberia attracts the attention of researchers, including anthropologists, geneticists, historians, linguists, and dentists. During the Upper Paleolithic period, immigrants to America passed through this territory. The ancient "open" border of contact between Mongoloids and Caucasians is located in

Western Siberia, where two large races mixed and there was a need for active study of mestization.

Mestization - the mixing of peoples and races - is a powerful process, considered as one of the most fundamental factors in the division of the human population into large and small races. Transitional and, most often, mixed by origin, sometimes undifferentiated racial types were formed in ancient times. These include the populations bordering between Caucasians and Mongoloids in Western and Southern Siberia, the Urals, Kazakhstan and Central Asia.

Thus, in the literature, the authors express contradictory data on the shape and structure of the skull and head in different peoples and in different periods of development, and in some sources the transience of these changes can be traced, within only two or three generations.

But the studies of the listed authors who published their results are experimental in nature, and, therefore, cannot be fully applied to living people. In this regard, it is especially important to establish the shape and size of the head and face with a normal bite.

S. I. Krishtab, examining children, found that pronounced brachycephalic bites are more common among physiological bites, and mesial bites are more common among pathological ones, and, conversely, orthognathic and distal bites in dolichocephalians, respectively.

However, it is known that the final formation of the maxillofacial system ends by the age of 16-21, therefore, the head and facial pointers change with age.

The bite affects the magnitude of the mandibular angle, which varies significantly throughout life. In X-ray cephalometric examination of persons aged 18-29 years, according to V. N. Trezubov (1998), the value of orthognathic bite ranges from 112° to 134° (on average $119.8 \pm 5.0^{\circ}$). The authors (Sapin M. R., Bilich G. L., 2001) [70 p.28] noted that the angle of the lower jaw in an adult is $110-130^{\circ}$. The authors also provide contradictory information about the magnitude of the angle of the mandible in men and women.

G. G. Manashev (2000) found that in boys (aged 16-21 years) the angle is $128.3 \pm 0.77^\circ$, while in girls it is less — $114.19 \pm 0.38^\circ$.

However, different researchers who study the dental-maxillofacial system, and specifically the angle of the lower jaw, give contradictory parameters that range from 105° to 150° . There are few works on the ethnic features of the structure of the lower jaw.

The most contradictory results regarding the dependence of the angle on the shape of the face and head were obtained in separate studies. According to G. V. Kuznetsova [45 p.48], the angle of the jaw branch has a large value in leptoprozopes and a smaller value in eurioprozopes. On the contrary, I. I. Uzhumetskene (1970) noted the absence of a connection between the mandibular angle and the shape of the face. A. Benninghoff, K. Goertler (1968) found that individual variations in the angle of the mandibular branch depend on the overall shape of the skull.

Anatomical variability of the cerebral and facial parts of the skull was revealed, which was determined by coordinated rearrangements in the maxillary system. However, these data are very contradictory. So, researchers (Khoroshilkina, 1999, 2003; Gioeva Yu. A., 2000; Zhulev E. N., Pestrikova V. N., 2000; Bratukhin N. B., 2001), on the contrary, believe that at the beginning the skull is formed, and then the formation of bite occurs. But the authors are unanimous in one thing - all organs of the craniofacial system have a mutual influence on each other.

A study by Brazilian scientists is devoted to the description of orofacial indices and indicators of facial proportions in adults, depending on the type of face and gender, and to determining the possibility of establishing a method for classifying face types based on anthropometry. The results obtained in the survey of 34 white men and 71 women show that the average values have significant gender differences: facial index, lower facial index, upper facial index and proportions of mandible height for men and proportions of mandible height for women. The following parameters were found to be significant for predicting face

types: facial index, upper facial index and the proportion of mandible height for dolichofacial type of men; and the proportions of mandible height for dolichofacial and lower facial index for brachyfacial type of women. In general, some indices and orofacial proportions in this variation correspond to the type of face and gender. The authors conclude that, in general, the anthropometric variables in this study are not good predictive values for determining the type of face.

The relationship between the parameters of the dental-maxillofacial system

Dentists and anthropologists have repeatedly noted the existence of a correlation between the size of teeth, length and body weight, as well as with elements of the skeleton and skull. L. L. Kolesnikov (2000), G. G. Manashev (2000), P. N. Sharaykin (2000), L. S. Persin et al., (2003), E. N. Anisimova (2004) noted that the correlation coefficients between the sizes of teeth and other parts of the human skeleton are small (no more than 0.2), but they slightly reduce the taxonomic value of odontometric features.

T. I. Sanzhitsyrenova (2000) noted high correlation coefficients between the parameters of teeth and dentition in Buryats. V. L. Tachieva et al. (2004), on the contrary, pointed out the absence of a reliable relationship between the sum of the width of the upper incisors and the width of the dentition in the area of the first premolars in Kalmyks. Yu.G. Smerdina (1997) established medium-strength relationships between mesiodistal tooth sizes and the parameters of dentition and apical bases in the northern Khakas and Chulym Turks.

These researchers, studying the size of teeth and dentition, did not pay attention to the parameters of the head and face. In this regard, a holistic view of the dental-maxillofacial system is not created.

The width of the dental arch in the area of the first molars, according to S. Izard (1950), is one third of the zygomatic diameter. And at the same time, the correlation coefficient was 0.88 between the two parameters, and also that the distance between the first molars was determined by the zygomatic width (cited by F. Ya. Khoroshilkina, 2004).

Analyzing the sources given in the review, it should be noted that researchers mostly consider different parts of the head, face, and skull in isolation from each other. Describing the structure of the skull or head, they do not pay attention to the shape and structure of teeth, dental arches, bite, or vice versa, note the structure of the latter and at the same time do not provide data on the shape of the face and head, do not state signs of age and sexual variability.

Understanding facial harmony and proportions is important for facial reconstructive surgery and orthognathic surgery planning. In the literature, neoclassical facial canons have been revised in populations including North American whites and African Americans.

The aim of the Al-Sebaei (2015) study was to establish a baseline for individual anthropometric facial measurements and to verify the validity of 3 neoclassical facial canons in a cohort of young Saudi adults living in the Arabian Peninsula. To perform the study, a group of 168 healthy, aesthetically pleasing students from Saudi Arabia living in the Arabian Peninsula (93 men and 75 women aged 20-24 years) was selected. A caliper was used for measurements, three neoclassical facial canons were measured; three vertical heights of the face, the orbital norm (the distance between the medial and distal edges of the eye slit = the length of the eye slit) and the orbital-nasal norm (the distance between the medial edges of the eye slits of two eyes = the width of the nose) and was analyzed using the Student's t-test, a general linear modeling and paired comparison of averages. The results of the study: individuals have the same type of facial third and do not correspond to the orbital or orbital-nasal canons. The three studied neoclassical canons could not be confirmed in young people living in the Arabian Peninsula. Thus, aesthetic goals in reconstructive and orthognathic surgery should take into account ethnic characteristics.

Anthropometry is the science responsible for measuring a person's weight, size, and proportions and provides valuable and objective information on how to characterize phenotypic variation and morphology. Among the new methods of face analysis, the stereophotogrammetry method has shown excellent results, fast

stereophotogrammetry cameras photograph objects from different angles. The authors (Alvaro Augusto Junqueira Junioretal, 2016) analyzed the profile of 60 individuals (30 men and 30 women), healthy young Brazilian adults, from 18 to 30 years old, in order to determine the general facial norms of the subjects, to create a database of measurements on the face. The methods used in the study provided an objective analysis of the facial profile of a group of healthy young Brazilian adults. Vectra M equipment has shown a high level of accuracy and stability.

L. G. Farkas et al. (2007) found that surgical correction of craniofacial deformity depends on accurate knowledge of the craniofacial norms of the patient's racial values. The norms of North American whites should be limited to patients of European descent and should not apply to people of other races. This study sought to identify differences in anthropometric measurements of the craniofacial complex between African-American and North American white subjects of both sexes of similar age (18-25 years old). The research group consisted of healthy young African American adults, 50 men and 50 women. The analysis of craniofacial morphology was based on 51 anthropometric measurements: 9 cranial, 10 facial, 8 orbital, 14 nasal, 4 oral and 6 auricular. The results were compared with 51 norm indicators previously established for North American whites in the same age group. High differences between the groups were found in each craniofacial region, especially in the orbit and nose, and confirmed the need to establish separate standards for African Americans for surgical correction of the head and face.

H. Lawan Adamu et al. (2016) studied sexual demorphism, as well as sexual prediction using facial linear and angular measurements, among the Hausashtata ethnic group of Kano Nigeria. In conclusion, the authors concluded that gender discrimination can be established using linear dimensions and the angle of the face. The gender of an individual of the Hausa ethnic group can be determined using linear facial dimensions. Despite the sexual dimorphism shown by the facial angles, only the nasal angle was a good sex discriminator.

Craniofacial anthropometric norms for young Malays were established by the authors [Ngeow W. C., Aljunid S. T., 2009]. The research group consisted of 100 healthy volunteers aged 18-25 years with an equal number of women and men who did not have a history of mixed racial origin. 22 linear measurements were taken twice from 22 landmarks in six craniofacial regions. As a result, it was found that the data of the Malays were similar in many similar dimensions to the Singaporean Chinese.

Radiographic cephalometry as a method of studying the structure of the face and bite in orthodontics

Many authors believe that in order to accurately determine the localization of morphological abnormalities in the facial skeleton and dental area with malocclusion, it is not enough to examine the patient and his diagnostic models. Accurate recognition of abnormalities is an important component of the morphological and functional diagnosis, on the basis of which a targeted treatment plan and prognosis are based. To increase the amount of objective information about the patient's maxillofacial complex, various additional examination methods were proposed: graphical, anthropometric, X-ray, photostatic, functional and others.

The most objective method of assessing the condition of dental-maxillofacial structures is the method of lateral telereöntgenography of the head followed by cephalometric analysis of the X-rays obtained. The basis of the method is that strictly identical conditions are used in the production of images of patients, namely: a large focal length, which avoids significant projection magnifications and combines the bone structures of the same name on opposite sides of the face on the radiograph; the sagittal plane of the head is strictly parallel to the cassette; the central X-ray beam is always directed to the same point of the head perpendicular to the sagittal plane. All this creates the necessary conditions for comparing serial images of one person and images of different people.

A large group of authors claims that the profile telereöntgenogram (TRG) shows the shape, structure of the skull and facial skeleton in unchanged shape and

minimally enlarged size. The method allows you to determine the proportionality of the maxillofacial skeleton, classify the norm and see the pathology taking into account the shape of the base of the skull, the relationship of the jaw bodies and the profile of soft tissues, study the relationship of dental arches with their bases, jaws with the skull, detect signs of growth and development, analyze the changes achieved as a result of treatment and evaluate its effectiveness. TRG analysis is important for solving the issue of indications for extraction of individual teeth in the treatment of malocclusion, for solving the issue of plastic and maxillofacial surgery.

For the first time in 1941, Brodie's work on the growth of the head from three months of age to 8 years was published. The author performed TRG 6 months after birth until the age of 5, and then annually. Based on the analysis, he put forward his theory of parallelism, which suggests that the morphological pattern of the head is established by the age of 3 months or, perhaps, even earlier; once established, it does not change with age; the face does not change its slope to the base of the skull and its growth is directed forward and down without "jumps and stops".

Most scientists emphasize that knowledge of the dynamics of the growth of the jaws and the face as a whole, understanding the interdependence of the growth rates of individual parts, knowledge of the direction of growth can and should be successfully used in planning the treatment of malocclusion and in predicting its success.

The base of the anterior cranial fossa is widely used as the reference plane when analyzing the position of the jaws in normal and malocclusion, as well as when evaluating treatment results. The facial and cerebral skulls, connected by a system of craniofacial sutures, are mutually influenced by each other. Periods of increased facial growth are associated with the formation of removable and permanent periods of bite. It has been proven that the upper jaw grows more in the areas of its junction with the bones of the base of the skull due to apposition in the frontal area.

In recent decades, orthodontists, influenced by ideas about the connection between malocclusion and soft tissues of the face, have begun to study facial deformities with the facial contour, using lateral radiographs of the head. As indicated, the first practical application of the X-ray cephalometric analysis method was used, in addition to studies of growth and development processes, in evaluating treatment results. At the same time, analytical methods applicable in clinical practice for the study of norm and pathology are being developed, well-visible and stable anatomical points on the facial skeleton and skull on the lateral radiograph are being sought, as well as planes that connect these points.

The Downs method. The standards derived from it are based on the study of cephalograms of 20 individuals (10 boys and girls) aged 12 to 16 years with perfectly correct occlusion, perfectly balanced function and aesthetics. Downs believes that knowing the differences in the relationship of teeth with the skeleton in such ideal people with respect to the face will be invaluable in detecting areas of disharmony in malocclusion. In the analysis, the author uses 9 angular and one linear measurement and divides it into two parts: I part - skeletal analysis and part - dental analysis. In the first part of the analysis, the skeleton of the face as a whole is studied through the angular relationships of these planes. The method of analysis is widely used in practice. The disadvantages of the method include the fact that great importance is attached to the facial angle, which is formed by two variable planes: the facial plane is variable due to the variability of the size of the symphysis, the Frankfurt horizontal is variable in itself.

Downs, studying the facial profile, noticed that the position of the lower jaw can mainly be used in determining the balance of facial proportions. He drew attention to the fact that facial proportions can be retroactive or protrusive, but the harmony of facial proportions will not be disturbed. The author conducted telereöntgenographic studies in 20 American children, including children of the black race, with normal bite between the ages of 12 and 16, half of whom were boys, the other half were girls. Diagnostic models, photographs, and cephalometric images were taken from all the examined patients. Having studied their Downs, I

derived the average measuring values. Downs chose the Frankfurt plane as the starting point for defining retro, ortho, and prognathies. Based on the data obtained, depending on the size of the facial angle N-Pg-Or-Ro, Downs identifies the following 4 types of faces: I-retrognathic face (facial angle is 82°); II – mesognathic face (facial angle is 87°); III – prognathic face (facial angle is 93°); IV – a true prognathic face (the facial angle is 90°). The latter, type IV of the face differs from type III in that the angle of convexity (LN-A-Pg) in type IV ranges from $+9$ to $+12^\circ$, and in type III it is 5° . The author deduced the regularity of the ratio of the facial skeleton for each type of face and found a connection between the facial angle, the angle of the Frankfurt horizontal and the plane of the lower jaw. Downs measurements are divided into skeletal and dental.

Of course, the methods proposed by other foreign researchers have their undeniable advantages. For example, A.M. Schwarz was the first to determine that the spinal plane of the SpP separates the area of the dentition and jaws from the skull. Thus, the author divided the facial skeleton into two parts: the gnathic one, located under the spinal plane, that is, the jaw with dentition, and the cranial one, localized above the spinal plane, that is, attached to the base of the skull. A.M. Schwarz called the gnathic part of the facial skeleton the dentofacial complex. The dentofacial complex may occupy a different position in relation to the base of the skull, which is associated with individual genetic features of the structure of the facial skeleton, as well as anomalies and deformations of the dentofacial apparatus. A. M. Schwarz emphasized that every specialist should be able to make a differential diagnosis of the genetic norm from the pathology caused by malocclusion. In facial aesthetics, the author paid special attention to the value of the volume of soft tissues, since these data can both level and worsen the abnormal profile. A.M. Schwarz, taking into account anthropometric studies of the head profile, identified three parts: craniometric, gnathometric and profilometric. Summarizing, A.M. Schwarz, to determine the individual features of the structure of the skull, you need to know two angles: facial (LF) and incline angle (LI). Thus, an individual genetic profile makes it possible to diagnose it from an abnormal one

and determine whether it worsens or compensates for it. For example, a genetic profile with a forward-sloping chin significantly worsens the abnormal profile associated with progenia, while with a backward-sloping chin it will level it out. These facts must be taken into account in terms of predicting the outcome of orthodontic treatment, since in the treatment of progenia, occlusion can be restored, but the chin protruding anteriorly will remain, which is unacceptable for the female in the aesthetic aspect. The orthodontist should warn the patient about such facts and, if necessary, resolve the issue together with the maxillofacial surgeon. Gnatometric studies under certain conditions help to identify the morphological features of various types of occlusion anomalies. The volume of the soft tissues of the face is crucial in the profilometric analysis. When choosing a treatment method, it is important to take into account the thickness of the soft tissues of the skin, which can compensate for an incorrect profile, and in certain cases worsen it. These facts have priority practical significance for the diagnosis and selection of the most optimal treatment method, occlusion abnormalities.

Engle's disciple and follower is Tweed, who has made a great contribution to the development of orthodontics. In particular, he developed the concept of uprighting teeth in the basal bone with an emphasis on the lower incisors, resumed tooth extraction and popularized the removal of the first premolars; he improved the clinical application of cephalometry, discovered the diagnostic facial triangle, developed the concept of step-by-step treatment and presented the preparation for support as the main stage in treatment; he developed a preorthodontic guiding program using serial removal of milk and permanent teeth. He discovered the diagnostic facial triangle, which was a diagnostic tool of cephalometry and an assistant in the choice of treatment.

The McNamara analysis was first presented in 1983. The FH and Ba-Na lines are used as the starting plane. In a normally balanced occlusion, the skeletal and dentoalveolar components of the jaws are harmonious with each other. Class III malocclusion is characterized by Class IV protrusion (skeletal prognathism). Due to the I/H protrusion, the dentoalveolar segment is also in front. This type of malocclusion

can be effectively cured by extraoral traction in young patients, or by osteotomy according to Le Faure, 1 or in more severe cases by anterior osteotomy in / h in adults, the ratio of I/ h and n/ h is normal, there is a dentoalveolar protrusion. This type of malocclusion can be cured more easily by dental removal. It is necessary to accurately determine the difference between skeletal and dentoalveolar abnormalities. It is in this case that the McNamara analysis finds its application. The analysis is divided into: skeletal measurements, dental measurements, airways. It should be noted that this method is the only one that takes into account the condition of the airways, which is important for clarifying the etiopathogenetic mechanisms in anomalies of the dental system.

But, given the above, there is still no need to overestimate X-ray cephalometric analysis, because it is an additional method to clinical examination, and deviations of cephalometric indicators from the average are not a strict indication for treatment, especially if there is compensation in another area of the facial department.

Thus, the orthodontic literature contains a large number of different cephalometric analyses, but none of them is universal for achieving all goals, they all have disadvantages. For this reason, we consider it right to use several methods of cephalometric analysis for a particular patient at once. In addition, cephalometric analyses are often based on comparing the data obtained from the examination of a particular patient (group of patients) with the average values in this population (for example, Europeans). Therefore, in recent decades, a number of works have appeared in foreign literature devoted to the study of morphometric and cephalometric indicators of the norm for individual ethnic groups and nationalities, which have their own characteristics.

Nevertheless, the indicators of norms developed by foreign authors need to be checked for their acceptability for people in our geographical area. The use of averages in the diagnosis of dental anomalies for our population is unlikely to be correct. For this reason, it is advisable to examine a group of people in the geographical zone of Central Asia with a formed orthognathic bite.

Facial aesthetics and functional occlusion are recognized as the most important goals in orthodontic treatment. A significant number of works have been devoted to the orthodontists' interest in facial contours and their racial variability. Studies of the cranial contour of many racial and ethnic groups in most cases aimed to assess specific typical anomalies compared to standards or "norms" created for specific racial or ethnic groups. Currently, we have excellent data from many ethnic groups on cephalometric norms. These include: Japanese, American Whites, Chinese, Australian Aborigines, Swedes, Africans, Hawaiians, and Canadians. Significant differences were identified in skeletal features and soft tissue profiles among white American, European, African American, Korean, Japanese, and Chinese populations. It has been proven that in Asian societies the incidence of malocclusion of class III is higher than in Caucasians. There have also been separate reports on the difference between white populations of different continents and countries.

However, there have been no definitive studies on this subject taken from Bangladeshi people, a part of the population of the Indian subcontinent, ethnically called "Bangali", who have peculiar facial and physical characteristics with a peculiar lifestyle and culture.

To date, the number of patients in the Indian subcontinent using orthodontic treatment is increasing, orthodontic treatment is becoming popular in this region, and due to the lack of final regulatory data, cephalometric assessment of orthodontic patients in Bangladesh is not yet used. There is no standard by which to assess the degree of deviation in orthodontic treatment. Most orthodontists simply trust the regulatory data of Japanese or European population groups. The authors of this publication [Ali Ahsan et al.] set a goal: to determine the cephalometric norms for Bangladeshi adults and to investigate the nature and extent of these differences with the normative data of the Japanese and European populations. During the study, the results were obtained that the maxillofacial complex of Bangladeshi adults was located more anteriorly relative to the base of the skull (SN), compared with Japanese and European adults. In addition, the

effective length of the upper jaw and lower jaw was shorter compared to Japanese and European adults. These findings were recommended by the authors for planning orthodontic treatment for Bangladeshi adults.

Treatment of patients with jaw deformities

According to the published results of clinical observations and experimental studies, orthodontic methods can correct the position of individual or entire groups of teeth, the shape of dental arches. However, it is difficult to achieve an increase or slowdown in jaw growth by orthodontic methods, especially after the end of the formation of the facial skeleton.

Irrationally performed orthodontic treatment of skeletal deformities can change the slope of the front teeth, cause pathological processes in periodontal tissues, which is accompanied by resorption of the roots of the teeth. At the heart of bone reconstructive surgery is the task of moving the upper or lower jaw to the desired position in order to achieve a stable result. Deformities of the jaws are manifested by abnormalities of normal size, there is an incorrect position relative to other bones of the skull, both the facial and cerebral divisions. The goals of surgical treatment are directly dependent on the type of deformation and the ratio of dentition. However, the elimination of the skeletal form of jaw deformity does not occur during orthodontic treatment.

In modern maxillofacial surgery, an important achievement is considered to be the expansion of indications for such operations. The main goals of such a comprehensive treatment of facial and jaw deformities are considered to be the achievement of: 1 - facial aesthetics; 2 - dental aesthetics; 3 - functional occlusion; 4 - healthy periodontal disease; and, finally, 5 - stable result. The goals of orthognathic surgery are to create a correct dental arch; restore normal occlusion; and form an aesthetically harmonious face.

When evaluating the orthodontic treatment of skeletal forms and malocclusion, it was revealed that the possibility of conservative treatment in adult patients lacks an effective result. These conclusions are confirmed by the fundamental, experimental and clinical studies of the authors, which led to the

development of methods of orthodontic surgical treatment of skeletal forms of jaw deformities and their further implementation.

H. A. Kalamkarov, evaluating the results of orthodontic treatment of 850 children, indicated that it is possible to correct the position of the teeth and the shape of the dental arch. But in practice, the shape and size of the jaw, unfortunately, do not respond to orthodontic treatment. In this regard, the author recommends conducting scientific research on the development of surgical methods for the treatment of skeletal forms of jaw deformities. The treatment of patients with facial skeletal deformities, according to most clinicians, is necessary with an integrated approach. Specialists in their friendly research work should reasonably plan comprehensive treatment and the stages of its implementation.

Therefore, the urgency of the problem of treating patients with jaw deformities is undeniable, since the percentage of recurrence of deformities remains quite high.

S. E. Ivanova analyzed the treatment of various types of pathology of the structure of the facial skeleton in more than 54 patients. The author determined the criteria for the movement of the upper and lower jaw, calculated the timing of treatment, and also indicates the need to preserve the volume of the oral cavity in order to prevent a recurrence of deformation.

Another author (A. Abdukadyrov), when treating patients with enlarged vertical dimensions of the facial skeleton, the same concept is supported, namely: incorrect diagnosis of combined deformities of the jaws; irrational use of surgical methods of treatment; insufficiency of retention-fixing elements; lack of orthodontic training. At the same time, the author notes that many issues remain unresolved: there is no interaction between surgeons and orthodontists in carrying out complex medical and rehabilitation measures; due to the interdental fixation of osteotomized jaw fragments, it is not possible to use early functional load, doctors do not have a unified tactic for diagnosing and treating patients with jaw deformities, which often leads to irrational treatment, causes the development of complications and relapses.

Combined orthodontic and surgical treatment of maxillofacial deformities, normalizing forms of the function of the maxillofacial region, occlusion, aesthetics, should be carried out based on modern treatment concepts, taking into account the ethnic features of the structure of the maxillofacial region. When conducting orthodontic treatment, orthodontists need to have a plan for bone reconstructive surgery, and the treatment should be carried out according to a single tactic that has been developed in collaboration with maxillofacial surgeons. If orthodontic treatment is carried out irrationally, then this will negatively affect the surgical intervention.

In the process of orthodontic treatment, various designs of mechanically operating both removable and non-removable equipment are used. In orthodontic treatment at the postoperative stage, in order to prevent the development of relapses of deformities, it is necessary to create multiple fissure-tubercle contacts of antagonist teeth, to exclude the adverse effect of functional factors.

In the modern period, orthodontists are introducing functional methods of treatment, since after mechanical treatment with existing devices, recurrent anomalies are often observed. However, without mechanical action on the dentition, in most cases it is not possible to correct occlusion anomalies. In this regard, simultaneously with devices that normalize the functions of soft tissues, mechanical elements are introduced into the design of functional devices for more efficient movement of teeth. It should be noted that functionally functioning orthodontic devices lengthen the treatment process. The focus of these devices is to establish a dynamic muscular balance, which is necessary to preserve the results of treatment, and not to change the morphological system. It is mandatory to use complexes including myohymnastics, mechanotherapy to ensure the stability of the results of surgical, orthodontic and orthopedic treatment. Some authors attach great importance to this.

A number of authors point out that orthodontic measures are required to ensure aesthetic and functional results, achieve their stability, and prevent relapses before, during and after surgery. However, there are many controversial issues

when diagnosing dental-alveolar, as well as skeletal types of deformities. There is a need for detailed diagnostics, the use of modern X-ray examination, determining the scope of orthodontic treatment, identifying the role of an orthodontist in the treatment of various types of deformity, a differentiated approach to the treatment of certain types of deformity.

In the process of planning and conducting the stages of orthodontic surgical treatment of patients with combined jaw deformities, many unresolved issues arise. This is evidence that there is a need to develop new approaches in the diagnosis, planning, and implementation of combined methods of orthodontic surgical treatment of patients. To improve the quality of specialized care, apply criteria for evaluating treatment results based on the analysis of telereöntogram indicators and the world experience of reputable scientists.

The structure and shape of dentition, teeth of representatives of the Uzbek population

Diagnosis of dental anomalies is considered relevant in the orthodontics clinic. Currently, clinical, radiological, anthropometric and functional diagnostic methods have become widespread. These methods combined make it possible to assess the morphological state of the patient's dental system. The main part of the complete examination is the biometric study of plaster models of dentition (anthropometric method). It is the results of the analysis of diagnostic models that occupy a dominant place in the preparation of an orthodontic treatment plan.

It is recommended to set their own anthropometric standards for each ethnic group: tooth sizes, parameters of dentition and apical bases of the jaws. These data are the basis of most traditional biometric techniques. In the Republic of Uzbekistan, orthodontists use anthropometric standards calculated for Europeans and Koreans to analyze the parameters of teeth and dentition.

In our study, biometric studies of teeth in the Uzbek population were conducted for the first time. The results showed significantly smaller values of the sizes of all groups of teeth in relation to the southern Altaians, with the exception of the lower first molars. In addition, as a result of the study, a lot of material has

been accumulated proving the ethno-diagnostic value of the structural features of the dental system. The data of mesiodistal sizes of teeth, taking into account the race of the individual, can be useful in achieving maximum aesthetic effect in the treatment of patients, will help solve the problem of choosing acceptable standards for the diagnosis and treatment of dental patients. In recent years, scientists have paid more attention to complex anthropological and population-genetic studies, the study of morphological features and racial characteristics, the study of the role of biological and historical factors, individual ethnic groups and the interrelationships between them.

The purpose of the study in this section was to develop anthropometric parameters of tooth sizes, dentition and jaw parameters on plaster models obtained from young volunteers of both sexes of the Uzbek population during the period of permanent formed occlusion.

For comparison, biometric methods were used by G. Korkhaus, A. Pont W. Bolton, Tonn. The mesiodistal dimensions of permanent teeth, parameters and shape of dental arches were compared with the data of O. D. Baidik, proposed for Mongoloids (southern Altaians) and Caucasoids (Russians).

One of the leading factors influencing the formation of dentition is the mesiodistal diameter of the crowns of teeth. The established average values of the mesiodistal sizes of the teeth of the upper and lower jaws for the Uzbek population are presented in Table 4.1. As can be seen from Table 4.1, no statistically significant differences were found in men and women when comparing the mesiodistal sizes of the right and left dentitions. Therefore, for practical use, these values can be recommended as averages for the right and left sides. A similar pattern is observed in the gender comparison of mesiodistal tooth sizes.

Table 4.2

Mesiodistal dimensions of permanent teeth in representatives of various ethnic groups in mm (M±m).

Teeth	Mongoloids, n=79		Caucasians, n=40		Uzbeks, n=96	
	Right	Left	Right	Left	Right	Left
Central incisors	8,74±0,06***	8,76±0,07***	8,44±0,12	8,38±0,1**	8,31±0,05	8,33±0,04
Side incisors	7,1±0,07***	7,07±0,07***	6,49±0,11**	6,56±0,127***	6,84±0,05	6,73±0,05
Canines	8,1±0,05***	8,05±0,06***	7,68±0,1	7,75±0,11*	7,62±0,04	7,61±0,04
The first premolars	7,37±0,06***	7,35±0,06***	6,63±0,11	6,66±0,11***	6,75±0,03	6,74±0,03
The second premolars	6,84±0,06***	6,89±0,06***	6,57±0,11	6,58±0,07**	6,51±0,03	6,52±0,04
The first molars	10,78±0,08***	10,74±0,07***	10,23±0,1**	10,2±0,12***	9,94±0,05	10,12±0,04
The second molars	10,25±0,08***	10,21±0,09***	9,58±0,11***	9,61±0,1***	9,01±0,07	9,22±0,06
Central incisors	5,55±0,05***	5,52±0,05***	5,41±0,06***	5,35±0,07***	5,17±0,03	5,16±0,03
Side incisors	6,14±0,05***	6,15±0,05***	5,83±0,08	5,84±0,07	5,79±0,03	5,72±0,03
Canines	7,01±0,06***	7,04±0,06***	6,57±0,08	6,63±0,11***	6,69±0,03	6,65±0,03
The first premolars	7,2±0,06***	7,22±0,06***	6,87±0,1	6,84±0,1**	6,77±0,03	6,78±0,04
The second premolars	7,17±0,05*	7,21±0,05**	6,94±0,08	6,81±0,09***	6,97±0,06	7,01±0,04
The first molars	10,72±0,09	10,8±0,08	10,34±0,11***	10,35±0,11**	10,79±0,05	10,69±0,05
The second molars	10,65±0,08***	10,66±0,08***	10,06±0,12	10,0±0,1**	10,21±0,06	10,12±0,06

Note: * - The differences regarding the data of the Uzbek group are significant (* - P<0,05, ** - P<0,01, *** - P<0,001)

A comparison of the average tooth sizes of Uzbeks with Mongoloids and Caucasians showed a high degree of significant difference in all groups of teeth ($P < 0.001$) in relation to Mongoloids, with the exception of the lower first molars ($P > 0.05$). The least pronounced differences were found in the mesiodistal sizes of teeth on the right relative to Caucasians, where the level of differences is especially significant on the second molars of the upper jaw and the central incisors of the lower jaw ($P < 0.001$).

During a biometric study of jaw models in representatives of the Uzbek population, it was found that the values of the anterior ratio of dental arches were distributed normally, with fluctuations from 69.7 to 87.3 with an average value of 77.44, a low standard deviation of 2.64 was observed (Table 4.3). The overall ratio ranged from 84.5 to 95.6 with a normal distribution and the average value was 91.48, while the standard deviation of 2.03 also indicates a slight difference. The average values for the anterior and general ratios of dental arches for men and women were similar and had no significant differences (Table 4.3). Thus, the value of 77.44 ± 2.64 for the anterior ratio and 91.48 ± 2.03 for the general ratio can be taken as the norm value for representatives of the Uzbek population. Comparison of the obtained data with Bolton data revealed close ranges of their average values for the anterior and total ratio of dental arches (Table 4.4). The degree of variation of the standard deviation in both populations was almost equal. The sex-specific analysis conducted by the staff of the University of Michigan [92 p.999] also did not reveal significant differences between men and women (Table 4.4). However, the average values of the anterior ratio of dental arches, according to the University of Michigan, were significantly lower than in our samples and Bolton's data, while the overall indicators in all three studies were similar. It should be noted that the standard deviations in the University of Michigan study were relatively higher than our data and Bolton's data.

The low variability between the highest and lowest values in the proportions of the upper and lower teeth determines the value of a harmonious dentition. This confirms the theory of Freeman, who pointed out that a large percentage of

orthodontic patients had discrepancies in the size of upper and lower teeth by more than 2 units of standard deviation of the Bolton values. Other researchers from the USA and China [167 p.499; 196 p.540] also found a significant difference in tooth size in various types of malocclusion. Therefore, the authors recommend including a Bolton analysis of the size of dental arches before planning orthodontic treatment.

Table 4.3

Anthropometric parameters of Bolton dentition in representatives of the Uzbek population

parameters	Men, n=47		Women, n=49		In total, n=96	
	the average value	standard deviation	the average value	standard deviation	the average value	standard deviation
$\sum u/j \llcorner 6 \gg$	45,09	2,27	45,06	2,05	45,47	2,19
$\sum l/j \llcorner 6 \gg$	35,20	1,79	35,19	1,63	35,20	1,70
$\sum u/j \llcorner 12 \gg$	92,39	3,80	91,80	3,72	92,09	3,75
$\sum l/j \llcorner 12 \gg$	84,16	3,89	84,3	3,37	84,23	3,61
The front relationship	76,74	3,03	78,12	2,01	77,44	2,64
The general relationship	91,10	2,26	91,85	1,71	91,48	2,03

Table 4.4

Anthropometric parameters of Bolton dentition in representatives of various ethnic groups

groups	The front relationship		The general relationship	
	the average value	standard deviation	the average value	standard deviation
Bolton	77,2	1,65	91,3	1,91
Узбеки Uzbeks	77,44	2,64	91,48	2,03
University of Michigan, Men/Women	73,5* [^] /73,4* [^]	3,5/3,6	91,0/90,6*	2,8/2,0

Note: * - differences between the data of the Uzbek group and the University of Michigan are significant (* - P<0.05), ^ - differences between the data of the Bolton group and the University of Michigan are significant (^ - P<0.05)

Based on the above, it can be concluded that the obtained data on the ratio of dental arches for the Uzbek population are similar to the data of the American population according to Bolton. This is interesting, since studies at the University of Michigan [92 p.999] found a difference in the lower anterior ratio of dental arches. Another group of American researchers [95 p.300; 119 p.311; 234 p.172] also found variation for different ethnic groups (whites, Latin Americans and African Americans) living in the United States. On the other hand, the absolute magnitude of ethnic differences generally exists, despite their relatively low statistical difference. The average values of the ratio of dental arches of American whites and representatives of the Uzbek population were identical, which allows for the possibility of applying a generalized Bolton analysis for both ethnic groups.

Thus, both proposed W. Bolton indices have confirmed their relevance, and identified the possibility for their recommendation for practical use in the study and evaluation of the ratio of the width of the crowns of the teeth of the upper and lower jaws.

Despite the fact that men had larger incisors, no statistically significant differences in mesiodistal tooth sizes were found in men and women. When studying the width of the dental arch in the area of the first premolars and first molars, significant differences were revealed in men and women.

Table 4.5

Anthropometric parameters of teeth and dentition (mm) in representatives of the Uzbek population, $M \pm m$

The parameter being studied	Men, n=47	Women, n=49
Upper right side incisor	6,84±0,07	6,84±0,06
Upper right central incisor	8,39±0,06	8,24±0,07
Upper left central incisor	8,41±0,06	8,26±0,07
Upper left side incisor	6,73±0,08	6,73±0,06
The distance between the canines	35,32±0,24	33,69±0,24
The distance between the first premolars	38,77±0,27	36,82±0,24***
The distance between the second premolars	44,86±0,30	42,82±0,82
The distance between the first molars	51,69±0,35	48,96±0,32***

Note: - differences relative to the data of the group of men are significant (***) - $P < 0.001$)

In men, unlike women, there was a significant predominance of the width of the upper and lower dentition at the level of the first premolars and first molars ($P < 0.001$) (Table 4.5).

It is well known that in order to obtain a good result of treatment, it is necessary to restore the relationship between the anterior and posterior groups of teeth, upper and lower dentition [108 p.312]. Therefore, many researchers have attempted to calculate the indices of the normal values of the dental arch. One of these authors was Pont A. (1909), who carried out his calculations among the population living in the south of France. The disadvantage of his work was that he did not specify the exact number of subjects included in the study. Nevertheless, in his work, Pon mentioned possible differences between different ethnic groups, and suggested that the reliability of his proposed index should be tested on other populations.

After the publication of Pon's work, his indexes, with some amendments for different ethnic groups, began to be used by scientists all over the world. The first of them were specialists from Austria H. Linder and G. Harth (1931), who, using the Pon method on Austrians, amended the index numbers. According to the data obtained by the authors, the premolar index is 85, the molar index is 65.

Subsequently, there were reports of differences in mesiodistal tooth sizes among representatives of various ethnic groups. Thus, representatives of the Mongoloid and Negroid races have larger teeth and dental arches than Caucasians. The study of mesiodistal tooth sizes in Spaniards found significant differences from Caucasians and similar tooth sizes to those of the Brazilian population, a significant part of which are descendants of immigrants from Africa and Europe [116 p.4; 234 p.173,174].

When determining statistically significant differences in the width of the crowns of the upper jaw teeth in men and women of the Uzbek population, we did not find (Table 4.5), which is consistent with the data of A. A. Celebi, E. Tan, I. E.

Gelgor [116 p.4] and contradicts the results obtained by F. Karaman [155 p.634], who determined that Turkish men have significantly larger teeth sizes than women.

Due to the significant predominance of dental arch sizes in men, significant differences ($P < 0.001$) were revealed in the indices measured in men and women (Table 4.6). The data obtained by us allow us to conclude that gender differences should be taken into account when conducting diagnostics and planning treatment of dental deformities. When comparing the indices obtained in our study with those proposed by Pon, some discrepancies in the molar and more pronounced differences in the premolar index of men and women were found.

Table 4.6

Indicators of the Pona and Ton index for representatives of the Uzbek population, $M \pm m$

The Pona index	Men, n=47		Women, n=49		The average value, n=96	
	M	m	M	m	M	m
Premolar	78,4	0,54	81,75	0,50***	80,1	0,40
Molar	58,8	0,48	61,49	0,42***	60,1	0,34
Tone Index	1,40	0,009	1,36	0,007***	1,38	0,006

Note: * - the differences regarding these groups of men are significant (***) - $P < 0,001$)

Thus, based on the analysis, we came to the conclusion that the indices of dentition developed by Pon, characteristic of Caucasians, can lead to errors in the diagnosis of dental anomalies in representatives of our ethnic group. The peculiarities of tooth sizes, shapes and sizes of dentitions must be taken into account when choosing orthodontic arches to correct dental anomalies.

The relationship of incisor sizes. Topp revealed a proportional relationship between the sum of the crown widths of permanent upper and lower incisors with permanent orthognathic bite. The Tonne index is 1.35.

Z.I. Dolgopolova studied the ratio of the sum of the width of the crowns of the milk upper and lower incisors according to the methodology developed by R. Topp and confirmed their relationship with temporary orthognathic bite. Dolgopolova's index is 1.3.

On plaster models of the jaws, we revealed a significant difference in the ratio of mesiodistal sizes of the upper and lower incisors (Tone index). In the Uzbek population, the index was 1.4 ± 0.009 for men and 1.36 ± 0.007 for women,

the differences were significant ($P < 0.001$), on average 1.38 ± 0.006 , which indicates a larger size of the upper incisors compared with the lower ones.

The relevance of the G. Korkhaus technique is confirmed by the results of our research, studying the size of the anterior segment of the upper and lower dental arches, depending on the sum of the width of the crowns of the four upper incisors. It is recommended to use confidence intervals of G. Korkhaus indices to analyze the measurement results.

The analysis of measuring the values of the anterior segments of the dental arches in representatives of the Uzbek population with a neutral bite, conducted according to the G. Korkhaus method, allowed us to establish that this indicator in men was 16.19 ± 0.17 , in women 16.10 ± 0.16 differences are unreliable, therefore, for diagnostic purposes, we suggest using its average value for both sexes, which is 16.14 ± 0.12 mm. The size of the anterior segment of the upper jaw corresponded to the sum of the mesiodistal dimensions of the four upper incisors. The possible minimum and maximum values of the above parameter of the upper and lower dentition are calculated. In all examined young volunteers with a neutral bite, the length of the anterior segment of the upper and lower dentition was within the confidence intervals of the G. Korkhaus indices.

According to O. D. Baidik [12 p.107], the most common form of the maxillary dental arch for Caucasians is a curved oval shape (93.0% of observations). While the southern Altaians have a truncated oval curve (46.2%) in almost the same frequency with the oval curve (46.2%), which was extremely rare in Caucasians, only in 5.0% of cases. There were no statistically significant differences in the shape of dental arches between men and women of the Uzbek population ($P > 0.05$). The most common form of the upper dental arch in Uzbeks, as in Caucasians, is described as a curved oval shape (92.0%), the shape of the lower dental arch in Uzbeks is parabolic in 100% of cases (Table 4.7).

Table 4.7

The shapes of the dentition of the upper and lower jaws in various ethnic groups (%)

	Uzbeks (n=96)		Mongoloids (n=208)		Caucasians (n=100)	
	upper dentitio	lower dentitio	upper dentition	lower dentitio	upper dentition	lower dentitio

	n	n		n		n
Oval	92	0	53,85±3,46	0	93,0±2,55	0
Truncated oval	4,5	0	46,15±3,46	0	5,0±2,18	0
Ellipsoid	3,5	0	0	0	2,0±1,4	0
The parabola		100	0	100	0	100

Photometric study of the type of face in representatives of the Uzbek population with normal bite

The object of the study was 96 photographs of young volunteers of both sexes of Uzbek nationality. Photometric analysis was performed using the Izard method. The morphological facial index (IFM) of Izard is equal to the percentage ratio of the distance from the intersection point of the midline of the face (oph) and the tangent to the brow arches to the point gn to the width of the face in the area of the zygomatic arches (zy—zy). The index value of 104 or more characterizes a narrow face (dolichocephaly), from 97 to 103 — medium (mesocephaly), from 96 or less — wide (brachycephaly). In a survey of 96 ethnic Uzbeks, the overall distribution by type of face showed that the average type of face prevails (45.83% of cases).

Table 4.8

The frequency of occurrence of various types of face in representatives of the Uzbek population

	Wide		Average		Narrow	
	abc.	%	abc.	%	abc.	%
Men (n=47)	2	4,3	21	44,7	24	51,1
Women (n=49)	7	14,3	30	61,2	12	24,5**
Average (n=96)	16	16,7	44	45,8	36	37,5

Note: * - the differences regarding these groups of men are significant (** - P<0,01)

Among ethnic Uzbeks, the facial index fluctuated between 90.32 -113.9%, its arithmetic mean was 102.3±0.52. In 45.8%, the facial index fluctuation is in the range 97.1-103.7%. The fashion was 98.5% and was observed in 2.1%. A distinct narrow face (with a facial index of 104% or more) was observed in 37.5%, a distinct wide face (with a facial index of 96% or less) was found in 16.6% of cases.

With a detailed distribution of the face shape of representatives of both sexes, it was found that a narrow type of face was observed in men in 51.06%, in women

— in 24.5% of observations. The average type of face in men was found in 44.7% of cases, in women - in 61.2%. A broad type of face was observed in 4.3% of men and 14.3% of women (Table 4.7).

According to O. D. Baidik [12 p.107], the most common type of face in Mongoloids is brachycephalic (67.9%), in Caucasians brachycephalic and mesocephalic forms (in 47.6% and 40.2% of cases).

In Uzbeks with a normal bite, the mesocephalic face shape prevails (45.83%), the predominance of the mesocephalic face shape in Uzbeks should be considered as an ethnic parameter for a normal bite.

Thus, there were no statistically significant differences in mesiodistal tooth sizes in men and women. In men, there is a significant predominance of the width of the upper and lower dentition at the level of the first premolars and first molars. The average tooth sizes of Uzbeks showed a high degree of significant difference in all groups of teeth in relation to Mongoloids.

COMPREHENSIVE TREATMENT OF PATIENTS WITH SAGITTAL JAW ABNORMALITIES

Orthodontic treatment was performed in 55 patients with jaw deformities aged 15-29 years. For patients, to normalize the position of individual teeth, the shape and size of dental arches, occlusion of dentition, a non-removable orthodontic technique was used, which allowed correction of the position of teeth in 3 planes: vertical, transversal and sagittal. The straight arc technique was applied - "straight-wire technique": braces with angulated groove, arcs of nickel-titanium alloys with shape memory effect and having superelastic properties, as well as arcs of cobalt-chromium alloys or stainless steels, which are manufactured by SIA Orthodox Manufacturer (Italy). In most cases, OrthoClassic braces with a groove of 0.022" (USA) were fixed during treatment. Braces with a negative torc (-6°) were used to prevent protrusion of the lower incisors. After the end of active

orthodontic treatment, observations were carried out in the period from 2 to 3 years. Pre- and postoperative orthodontic treatment included the following phases:

- 1) the leveling phase
- 2) Vertical installation phase,
- 3) the tightening phase,
- 4) the finishing phase,
- 5) retention phase using retention removable devices, non-removable retainers.

Braces were fixed according to generally accepted rules - on the vestibular surface of the crowns of the teeth.

The first stage of treatment included vertical alignment of the teeth. The majority of patients (n=9) had dental alveolar shortening or elongation in the area of the anterior or lateral group of teeth, deep incisor dysocclusion, deformation of the occlusal plane. In the first stage of treatment, the task consisted of tooth alignment; correction of vertical discrepancies in the levels of the dental alveolar arches of the jaws. The incisor tilt, the width of the dental arches in the lateral sections, and the shape of the dental arches were adjusted. To align the occlusal plane, we performed an elongation of one group of teeth, with a dental alveolar shortening of the other.

The shape of the dental arch of each individual patient from the first stages of treatment was reflected by the shape of the wire arches.

To ensure more efficient tooth movement at the first stage of treatment, wire arcs were used, which have weak permanent forces. Between the wire arc and the bracket, for mesiodistal sliding, a space of 0.002"-0.004" (inches) was preserved along the wire arc. Wire arcs with a diameter of 0.014"-0.018" were used when working with 0.022" braces. Round wire arcs were preferably used only in stage I. In order not to disrupt the position of the tops of the roots of the teeth, rectangular arches with a tight location in the groove of the bracket were not used.

In 6 patients, the protrusive position of the front teeth was pronounced, the vestibular position of the canines and there was no place for them in the dental arch, therefore, when the anterior part of the dental arch was lengthened, the first premolars were removed according to indications, distal displacement was also performed with simultaneous alignment of the front teeth.

Patients (n=55) used braces with a groove of 0.022" with an initial maxillary arch - 0.014" round CuNiTi arch. The maxillary canines moved separately from the group of four front incisors. The retraction of the canines lasted on average from four to six months. Elastic rings from the first molar to the canine were changed 1 time per day. If an elastic chain was used when moving the canines, then it was replaced every four weeks. It was important to set and maintain the position of the fangs according to the first class of Engl.

The next arc we used was a 0.016" x 0.022" CuNiTi; then a 0.018" x 0.025" rectangular arc made of stainless steel with closing loops, which was used to distalize the incisors. Depending on the amount of space to be covered, this arc was used for four to eight months. The hinges were installed distally from the braces of the lateral incisors, almost close to their lateral surface, so that the retraction of these teeth occurred without loss of the size of the torc, and the wire 0.018" x 0.025" completely filled the groove of the braces of the incisors. After the wire completely filled the bracket groove, to activate this arc, a 5 mm section of wire was left behind the tube of the first molar. Using forceps with notches on the working parts, the distal section of the wire was pulled out of the tube of the first molar and bent at an angle of about 45 ° upwards. The closing loop was activated by 1 mm every four weeks. The free spaces were not completely closed until the middle lines of the teeth were aligned and the canines were placed in the first class of the Engl.

On the lower jaw, the first one used a 0.016" CuNiTi arc, from which sufficient alignment and correction of rotations occurred. The second was an arc with closing loops. The final wire arc was a 0.017" x 0.025" stainless steel arc,

which was used after closing all the gaps between the teeth. The terminal arch remained in the patient's mouth for five months in order for the final installation of the roots of the teeth to occur. The duration of the active period of orthodontic treatment of patients was 12-18 months.

To align the Spee curve, a preformed 0.016" steel wire arc or 0.016" and 0.018" reversible NiTi arcs were used. Weak constant forces directed to the tip of the root were used for dental alveolar shortening.

Ligature braces were used for all patients, the most effective of which were the following arches for braces with a groove of 0.022":

- 0,016" CuNiTi was used more often in the first three months to align, correct rotations and give the correct position to the teeth;
- 0,016 x 0,022" CuNiTi was used to complete the alignment of teeth and give the correct shape to the dentition. If early control of the torc was necessary, then the wire was used as early as possible. The period of use on site is 6 months;
- 0,017 x 0,025" - the main working wire for the manufacture of main arcs, arc parts;
- 0,021 x 0,025" Di-Rect – was used as a final treatment and remained in place for up to 3-6 months.

Preoperative orthodontic treatment and preparation for bone reconstructive surgery

Preoperative orthodontic treatment at the 1st stage was carried out 55 for patients.

Orthodontic surgical treatment for patients with jaw deformities was performed in order to:

- ✓ Correct the shape and size of the dental arches of the upper and lower jaws;
- ✓ Normalize the axial tilt of the front teeth relative to the plane of the jaw base;

- ✓ to create conditions for constructive bite and movement of the jaw to the desired position during bone reconstructive surgery, for the appearance of dense fissureo-tubercle contacts of antagonist teeth;
- ✓ to normalize the position and articulation of the language;
- ✓ design and manufacture devices for interjaw immobilization after surgery.

Preoperative orthodontic preparation should:

- to promote the achievement of congruence of dentition;
- to contribute to the elimination of obstacles from the side of dental alveolar anomalies during the period of surgical movement of the jaws.

For the treatment of patients with permanent occlusion, non-removable orthodontic equipment and devices for intensive opening of the palatine suture were used. If the patient had dental alveolar elongation in the area of the lower incisors and canines, the facial height is normal or increased, with distal occlusion, protrusion of the incisors, dental alveolar insertion was performed in the frontal part of the lower dental arch (Fig. 5.1).

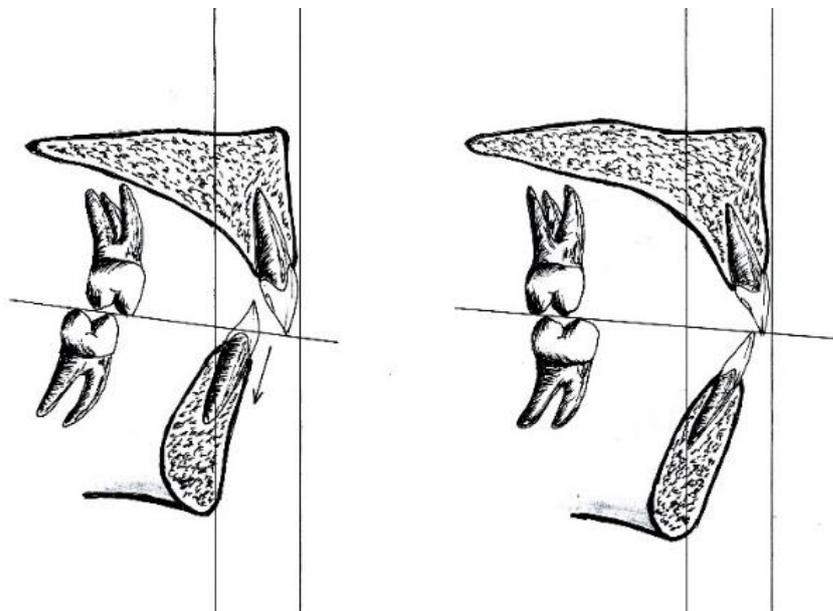


Figure 5.1. Preoperative orthodontic treatment:
dental alveolar insertion in the anterior part of the dental arch

If such alignment of the lower dental arch is not used, during surgical extension of the lower jaw, premature contact of the lower incisor with the tubercle of the upper antagonist may occur, and then further extension of the lower jaw occurs through undesirable vertical displacements: in front of the lower incisor will

slide along the palatine surface of the upper incisor, which can cause rotation of the lower jaw, while increasing the height of the incisor overlaps in the anterior part, and the height in the posterior part of the dentition will decrease (Fig. 5.2.).

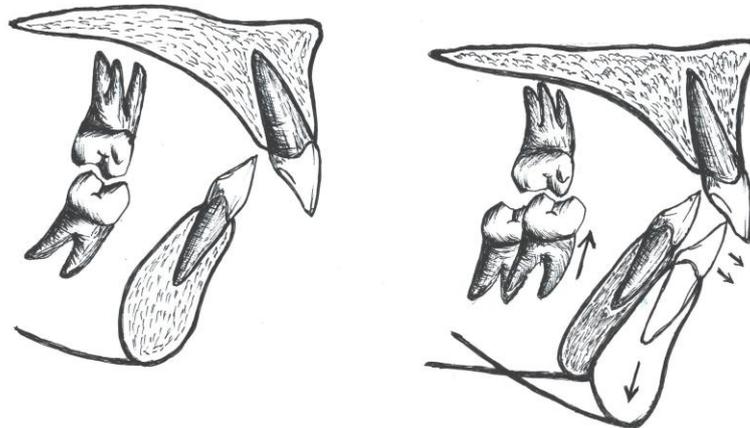


Fig. 5.2. Schematic representation of the facial height during surgical correction of jaw deformity without prior orthodontic treatment

With distal occlusion and retraction of the incisors, dental alveolar elongation was noted in the area of the upper and lower incisors. During preoperative orthodontic preparation, dental alveolar shortening was performed in the area of the incisors of both jaws for 12-18 months.

When the patient's facial height decreased, and the distance from the cutting edge of the lower incisor to the chin was normal, dental alveolar elongation was performed in the area of the lateral teeth, which allowed the chin to move down and normalize the facial height during surgery (Fig. 5.3).

Dental alveolar elongation in the area of the front teeth was not performed with increased facial height, vertical incisor dysocclusion. The vertical gap was not eliminated in order to prevent recurrence. Preoperative preparation included alignment of the dental arches for better control of the vertical plane, which took about 6 months (Fig. 5.4).

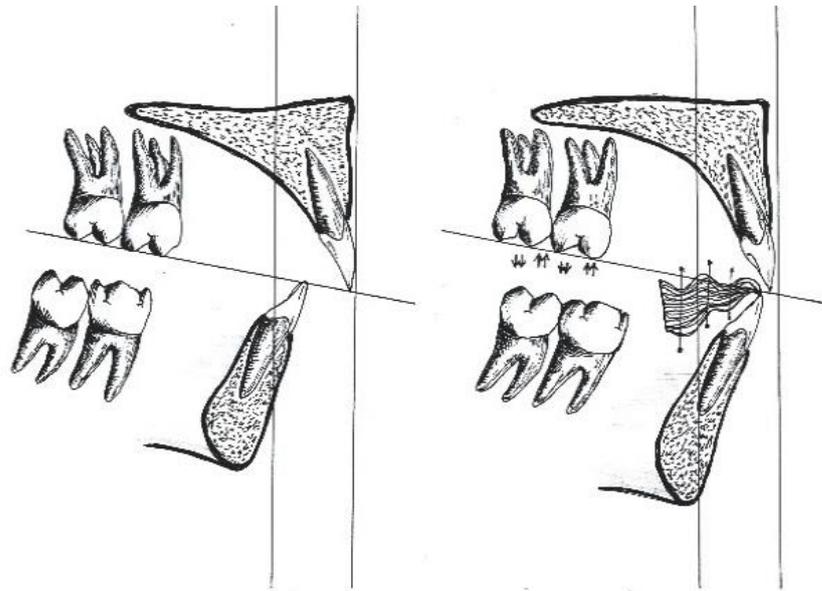


Figure 5.3. Preoperative orthodontic treatment: dental alveolar elongation in the area of lateral teeth

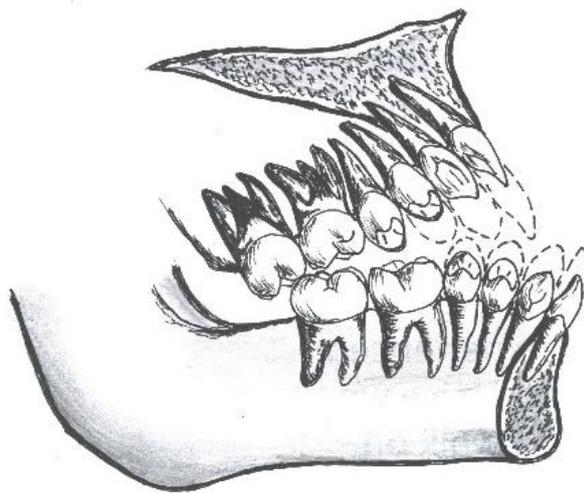


Fig. 5.4. Preoperative orthodontic treatment: leveling of dental arches

In the preoperative period, a correction of the compensatory incisor tilt, concomitant deformation, was performed, which consisted in turning the incisors in the lingual direction if they are rotated vestibularly and vice versa.

The purpose of this stage was to normalize the axial tilt of the incisors and canines. After the end of preoperative orthodontic preparation, the size of the

sagittal gap and the distance between the tubercles of the antagonist canines were considered a reflection of the sagittal displacement of the jaw bases.

In case of distal occlusion, incisor protrusion, correction of the vestibular tilt of the upper incisors was performed during 6 months of orthodontic treatment (Fig. 5.5).

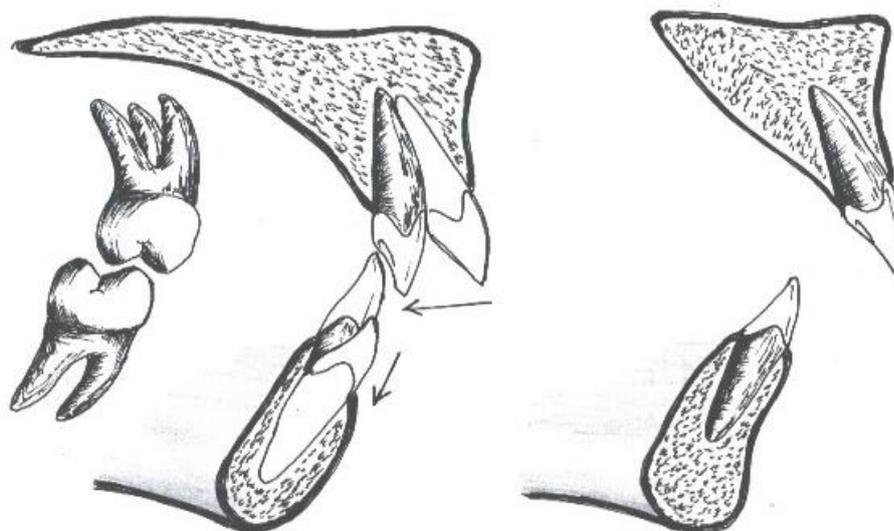


Figure 5.5. Preoperative orthodontic treatment: correction of upper incisor protrusion and dental alveolar elongation

In the case of distal occlusion, incisor retraction, the stage of preoperative orthodontic treatment was carried out for 12-18 months in order to correct the retraction of the upper incisors and dental alveolar elongation. Alignment and dental alveolar shortening of the anterior part of the lower dental arch was carried out only after normalization of the inclination of the upper incisors, the duration of this stage of treatment was on average 6 months. Thus, preoperative orthodontic treatment for distal occlusion and incisor retraction was carried out for 18 months (Fig. 5.6).

In mesial occlusion of the dentition, vestibularly inclined upper incisors in combination with lingually inclined lower incisors masked a significant discrepancy in the bases of the jaws. Preoperative orthodontic treatment consisted

in normalization of the axial tilt of the incisors, the duration of which was within 6-12 months (Fig.5.7.).

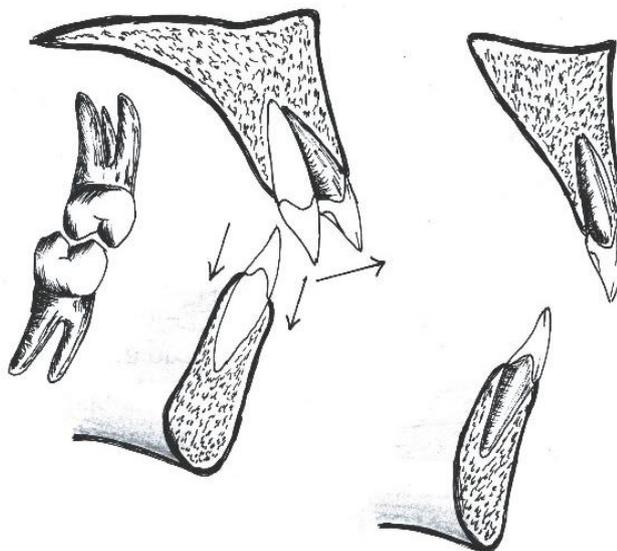


Figure 5.6. Preoperative orthodontic treatment: correction of upper incisor retraction and dental alveolar elongation

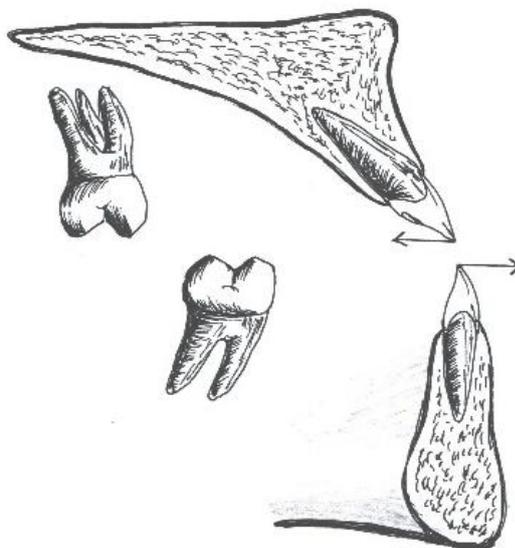


Fig. 5.7. Preoperative orthodontic preparation: normalization of axial incisor tilt

In order to carry out orthodontic preparation for bone reconstructive operations for intensive opening of the palatine suture on the upper jaw, 4 patients used a Biederman device. After intensive expansion of the upper dental alveolar arch, the

screw was closed with a rapidly hardening plastic, and to stabilize the achieved result, the device was left in the oral cavity for 6 months. To normalize the shape, size of the dental arches, tilt and position of individual teeth, the straight-wire technique was used at the same time.

In some patients with inferior retromicrognathia, there was a marked decrease in the size of the basal, alveolar, and dental arches. In these patients, the upper first premolars were removed, and the anterior part of the upper dentition was shortened with the help of microimplants, distal movement of the canines and front teeth was performed (Fig. 5.9).

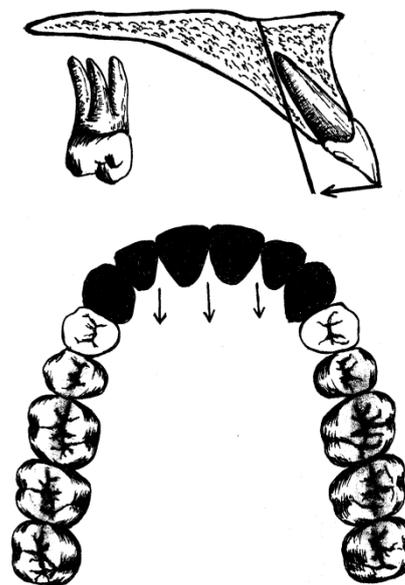


Fig. 5.9. Preoperative orthodontic treatment: 14 and 24 teeth, shortening of the anterior part of the upper dentition was performed due to distalization of the canines and frontal teeth

A wire grid was introduced into the design of removable orthodontic devices to normalize the position of the tongue.

In the preoperative period of orthodontic treatment with non-removable equipment, fixation of the equipment was performed; after bone reconstructive surgery, the alignment of the dental arch was performed in order to ensure their compatibility; normalization of the incisor tilt and position so that during the operation the ratio and establishment of a constructive bite, planned before the

operation of the position of the teeth, did not interfere with the movement of the jaws.

Preoperative orthodontic treatment was individual for each patient and differed both in method and duration of treatment: thus, in some patients, treatment consisted in the imposition and fixation of equipment, and in other patients, the first stage of orthodontic treatment was carried out for 12 months due to significant crowding, it was characterized by anomalies in the position of the front teeth, deformations of the dental alveolar arches.

Joint work of an orthodontist with a maxillofacial surgeon when planning bone reconstructive surgery

Fixation with stabilizing wire arcs for a period of at least 6 weeks in a passive state was performed after the final orthodontic correction before surgery. In the absence of any tooth movements, it is important to take casts and make a surgical mouthguard 1-2 weeks before the operation, followed by its fixation. Stabilizing wire arcs completely filled the bracket groove, i.e. 0.02 Gx 0.025" Titanium - molybdenum alloy (TMA) arcs or steel arcs in braces with a groove size; 0.017" x 0.025". The complete filling of the groove with an arc provided strength during double-jaw splinting and jaw immobilization. The patient was shown a combined orthodontic-surgical treatment (Fig.5.10).

After the end of preoperative corrective orthodontic treatment, X-ray examination, direct and lateral cephalograms, jaw models were prescribed. The models were cast in a semi-adjustable articulator.

The orthodontist and the surgeon jointly drew up a plan for the final position of the jaws, a constructive bite, in which a satisfactory functional and aesthetic balance can be achieved.

An important stage of preoperative orthodontic preparation is to ensure the immobilization of the lower jaw in the postoperative period, which contributes to success after performing bone reconstructive operations.

To minimize the separation, the plastic mouth guard at the points of contact of the teeth was made no thicker than 2 mm. If the lower dental arch is not aligned in the preoperative period, then some teeth come into contact through the mouth guard. In this regard, the mouth guard must be made neat, polished on the cheek surfaces, transparent, so that it is possible for good hygiene and control of its position during the operation. The mouthguard has a thicker tongue surface for strength, reinforced with wire, which is inserted into the plastic.



Fig. 5.10. Patient O. 17 years old. Long face syndrome. Combined jaw deformity: upper micro-, lower macrognathia, cross buccoocclusion of molars, dysocclusion of incisors. Pronounced narrowing of the upper dental alveolar arch (U-shaped), deformation of the shape of the dental alveolar arches, occlusal plane. Violation of the position and articulation of the language

The second stage of complex treatment was surgical, consisting in bone reconstructive operations on the jaws with an immobilization period.

Orthodontic measures during the immobilization period after bone reconstructive surgery

The task of the orthodontist is to ensure the stabilization of the occlusion of the dentition created as a result of the operation. The use of metal mini-plates allows surgeons to perform rigid fixation of the jaws. The use of rigid fixation reduces the time of immobilization after surgery to 2-3 days. To eliminate the possibility of lower jaw movements during early mobilization, additional button clamps were made in the mouthguard so that the mouthguard could be removed for cleaning, however, it was worn until the surgical stabilizing wire arches could be removed and active orthodontic treatment could be resumed. Removing the mouth guard without replacing the stabilizing wire arcs with softer, flexible wire arcs was a mistake..

A mild diet was recommended to patients for a month after surgery, then for two weeks patients should take food that required some chewing. In the 8-10 weeks following surgery, patients were allowed to return to a normal diet. To improve the condition, patients were prescribed exercise therapy. A month after the operation, patients were advised to carefully open and close their mouths within comfortable limits. Then, for the next 2 weeks, mouth opening and closing sessions were conducted for 10-15 minutes, as well as careful lateral movements of the lower jaw. During the period of 3 to 8 weeks, the level of movement was increased. The purpose of physical therapy was to normalize the movements of the lower jaw during the first eight weeks after surgery, to prevent the development of scar tissue, which could interfere with the full volume of movements of the lower jaw.

The orthodontist conducted weekly examinations of patients after surgery, monitoring the condition of the patient's occlusion, during the use of rigid fixation techniques, as well as double-jaw splinting.

Postoperative orthodontic treatment

Postoperative orthodontic measures were carried out depending on the state of stabilization of bone fragments and the volume of movements of the patient's lower jaw. To control occlusion, after removing the interdental fixation, during the period of the beginning of the resumption of the functions of the lower jaw, a plastic mouthguard was ligated to one of the dental arches (more often the upper one), or it was fixed using button clamps. Light elastic rings were applied to direct the movements of the lower jaw. The patient was prescribed an active exercise therapy program, physiotherapy treatment to improve the restoration of the normal volume of movements of the lower jaw. Patients who underwent rigid fixation without prolonged jaw binding, and patients who immediately after surgery used a mandibular exercise program, could satisfactorily open their mouths two to three weeks after surgery. This allowed the resumption of postoperative orthodontic treatment at an earlier date.

If wire fixation was used, the immobilization of the jaws and active orthodontic was postponed for 4-6 weeks, until the movements of the lower jaw of the patient acquired a satisfactory level, more often after the removal of immobilization after 3-4 weeks.

When using these device designs, no complications were observed during the immobilization period:

The third stage of postoperative orthodontic treatment was aimed at:

- stabilization of the operation results;
- the final correction of the interocclusal relationships of the dentition and the creation of an adequate functional load;
- elimination of conditions leading to jaw displacement;
- normalization of movements of the lower jaw, chewing and articulation with a new jaw position.

The purpose of the treatment was to preserve the position of the jaws, achieved as a result of bone reconstructive surgery, and normalize the ratio of dentition. All this is aimed at improving the appearance of the face, restoring the

functions of the maxillofacial complex, which ultimately should prevent the formation of deformations of the overlying parts of the maxillofacial skeleton.

One of the phases of treatment with a non-removable orthodontic technique is the finishing phase. In this phase, the last minor improvements to the position of the teeth were carried out. Elastomeric chains were used to create dense approximal contacts between the teeth, which were involved in further stabilization using continuous wire ligatures. And in order to achieve the final position of the canines according to the Engl class I, an elastic pull was used according to the P class from the upper canine to the lower molar.

The final goal of the treatment was to create dense fissure-tubercle contacts in the lateral segments of the jaws, achieved by using elastic rings with a diameter of 5, 6, 7, 8 mm, which were fixed in the form of a triangle, trapezoid, rectangle, S-shaped rods, as well as using a large diameter of 19.5-20 mm elastic rings. Elastic rings were fixed in the form of a zigzag thrust, which, if necessary, increases the force in one direction or another, has an M-shaped or W-shaped appearance. Before applying the zigzag thrust, the ligature with a hook was fixed in the area of the braces of the lateral teeth, the thrust was applied to the hooks from the lower molar to the upper premolar, lower premolar, upper canine. This elastic pull was applied when very soft steel round wire arcs were used, or segmental rectangular wire arcs were left fixed in the braces of the front teeth (from canine to canine or from the first premolar to the first premolar), when it was removed from the braces of the side teeth. This contributed to the control of angulation and torc of the anterior teeth and the establishment of dense fissure-tubercle contacts of antagonist teeth in the lateral sections of the dental arches. When applying elastic traction of class 2, the optimal force was 120-150 g. All patients received precise instructions on the rules for applying traction. During 2.5-3 months, fissure-tubercle contacts of antagonist teeth were established (Fig. 5.11).



Fig. 5.11. Patient G. 18 years old. Combined jaw deformity: upper retro- micro, lower macrogathia, cross buccocclusion of molars, dysocclusion of incisors and premolars. Moderate pronounced narrowing of the upper dental alveolar arch (U-shaped), deformation of the shape of the dental alveolar arches, the occlusal plane. Violation of the position and articulation of the language

Retention period

After surgical interventions and postoperative orthodontic treatment, the retention period was standard, but it was an important stage of orthodontic

treatment and guaranteed optimal results and an excellent prognosis of the treatment in all cases. In 15 patients, when planning orthodontic treatment, after diagnostic examination, selection of the necessary equipment, staging, determination of the duration of treatment in the set of planned measures, the retention period, as well as the methods and means necessary for its implementation, were particularly noted.

The main goal of orthodontic treatment is to stabilize occlusion to prevent recurrence.

The removal of non-removable orthodontic devices and the imposition of a retention device were carried out during the retention period of treatment. Removable and non-removable retention devices were used. Elastomeric mouthguards, removable retention devices, elasto-positioners, and non-removable retainers were used in the anterior part of the dental arches.

Orthodontic treatment with fixed devices lasted actively for 1-1.5 years, followed by a retention period of up to 2 years. If necessary, non-removable retainers were left for a long time, longer on the lower teeth, because it is known that the incisors of the lower jaw are more prone to recurrence. In patients with periodontal diseases, the retainer performed both a preventive and curative role. The position of the retainer in the oral cavity did not interfere with oral hygiene. However, when fissure-tubercle contacts were reached, dental supracontacts remained a problem. In this regard, selective grinding was carried out for 3 months, namely, grinding, polishing of chips, irregularities of the cutting edges of the front teeth formed as a result of uneven abrasion. The period of observation of the patient was 3-4 years.

Analysis of treatment results based on clinical examination, anthropometric measurements of the face and the study of diagnostic models of the jaws

The results of treatment of 55 patients with symmetrical and asymmetrical jaw deformities were analyzed. The analysis showed that there is no standard approach to the treatment of the same type of deformities. For each individual

patient, when eliminating jaw deformity, his individual characteristics were taken into account, and the ethnic norm developed by us was applied. It has been proved as a result of research that in most cases deformations of the jaws are combined, while if the structure of one of the jaws changes, then other bones of the facial and cerebral parts of the skull always change.

Foreign experts have conducted a large amount of research, which confirms the relevance of studying and further applying the ethnic norm for the treatment of patients with jaw deformities and obtaining stable long-term results.

When analyzing the long-term results of treatment, an assessment was made of the restoration of the aesthetic proportions of the face in the full face and profile, the degree of elimination of anatomical disorders and the state of occlusion of the dentition revealed in the preoperative period was considered.

The results of long-term treatment were evaluated in 15 patients with jaw deformities, 1-3 years after treatment (Fig. 5.11).

All patients were satisfied with the aesthetic results achieved after complex treatment. During the clinical examination, significant improvements in the proportions of the facial part of the skull were noted, the occlusion of the dentition was normalized. It was noted that the opening of the mouth occurs in full, no pathological changes were observed in the mucous membrane of the oral cavity. X-ray images obtained before and after treatment show the revealed changes characterizing the new relationship of the jaws.

The comprehensive assessment of the treatment results included the following criteria: subjective assessment of the appearance of the face, anthropometric measurement of the face, diagnostic models of the jaws, comparison of the results of the study, X-ray cephalometric studies, comparative assessment of facial photographs and profile.



Fig. 5.12. Patient N. is 19 years old. Long face syndrome. Combined jaw deformity: upper retro- micro, lower macrognathia, cross buccocclusion of molars, dysocclusion of incisors. Pronounced narrowing of the upper dental alveolar arch (U-shaped), deformation of the shape of the dental alveolar arches, occlusal plane. The Gothic sky. Violation of the position and articulation of the language.

Analysis of the results of combined orthodontic surgical treatment of patients with jaw deformities

Comprehensive treatment at the preoperative stage of orthodontic treatment helped all patients to normalize the position of the jaws, restore facial symmetry, correct the position of individual teeth of the upper and lower jaws. Dental defects were eliminated in 12 patients with removable partial dentures. 46 patients had their upper dental alveolar arch expanded.

By clinical examination of patients after orthodontic surgical treatment, a qualitative improvement in facial aesthetics was determined, facial symmetry was restored and free closing of the lips was achieved. Also, during the examination of the oral cavity, there was a coincidence of the incisive lines of the dental arches of the upper and lower jaws, the elimination of sagittal, vertical dysocclusion, the position of individual teeth was normalized, fissure-tubercle contacts of the teeth of antagonists were achieved, the discrepancy in the sizes of the dental arches of the upper and lower jaws was eliminated.

A comparison of data from anthropometric studies of facial proportions in 55 patients with jaw deformities after comprehensive treatment showed a significant improvement in the ratio of proportions of the upper, middle and lower parts of the face height.



Fig. 5.13. Patient F. 20 years. Combined jaw deformity: upper retro- micro, lower macrognathia, cross buccocclusion of molars, vertical dysocclusion of incisors and premolars. Pronounced narrowing of the upper dental alveolar arch (U-shaped), deformation of the shape of the dental alveolar arches, occlusal plane. The Gothic sky. Violation of the position and articulation of the language

However, the pronounced combined asymmetric deformities of the jaws could not be completely corrected, despite the improvement in facial aesthetics, as shown by the analysis of measurements (Fig. 5.13).

By biometric study of diagnostic models of the jaws of treatment in patients with jaw deformities, changes in the shape and size of the dental alveolar arches and the position of individual teeth were determined. In the preoperative period of orthodontic treatment, 46 patients received an extension of the upper and lower dental alveolar arches by 8.3 ± 0.5 mm, 6 patients underwent an extension of the upper dental alveolar arch by 6.4 ± 0.4 mm, 9 patients received a shortening of the anterior part of the upper dental arch by 2.7 ± 0.21 mm. As a result, normalization of the position of individual teeth has been achieved.

In postoperative orthodontic treatment, the coincidence of the incisor lines of the upper and lower dental arches was achieved in 54 patients, the elimination of the sagittal gap in 35 patients, shortening of the anterior part of the upper dental arch by 2.8 ± 0.11 mm in 9 patients, in all patients the position of individual teeth was normalized.

The data of the clinical examination were confirmed by the results of the study of diagnostic models of the jaws after treatment.

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