F. K. Dzalaeva

DIAGNOSIS AND TREATMENT OF PATIENTS WITH TOTAL REHABILITATION OF DENTITION, TAKING INTO ACCOUNT THE FUNCTIONAL AND ANATOMICAL FEATURES OF THE STRUCTURE OF THE TEMPOROMANDIBULAR JOINT

2023

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Electronic publication

Saint Petersburg
Naukoemkie technologii
2023

ISBN 978-5-907618-73-2

UDC 616.314
LBC 56.6

Reviewers:
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Dzalaeva, F. K.

Diagnosis and treatment of patients with total rehabilitation of dentition, taking into account the functional and anatomical features of the structure of the temporomandibular joint [Electronic resource] / F. K. Dzalaeva. – Saint Petersburg, Naukoemkie technologii, 2023 – 177. – URL: https://publishing.intelgr.com/archive/Diagnosis-and-treatment.pdf

ISBN 978-5-907618-73-2

For dentists of all profiles, teachers of dental school and Universities, postgraduate students, practical dentists, practical dental technicians and doctors.

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Electronic publication

Editor V.S. Kuznetsova

Signed for use on 26.06.2023.
The edition volume 2.0 MB

Naukoemkie technologii, Publishing House
Intel Group Corporation, Ltd.
website: https://publishing.intelgr.com
E-mail: publishing@intelgr.com
Tel.: +7 (812) 945-50-63

ISBN 978-5-907618-73-2

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LIST OF ABBREVIATIONS AND SYMBOLS

CMP - pain in the cervical muscles

VAS - visual analogue scale

URT - upper respiratory tract

TMP - temporomandibular pathology

TMJ - temporomandibular joint

AHI - apnea-hypopnea index

CTG - computed tomography

LDF - laser doppler flowmetry

MFS - myofacial syndrome

IMC - indicator of microcirculation

PSG - polysomnography

OSAS - obstructive sleep apnea syndrome

TRG - teleroentgenogram

Ultrasound - ultrasonography

CNS - central nervous system

ICP - (intercuspal position)

OHIP-14 - (Oral Health Impact Profile-14)

INTRODUCTION

Relevance of the research topic.

Most specialists in the organization of dental care believe that the need for orthopedic dental care is determined by a number of factors: medical and geographical living conditions, demographic and social characteristics, the prevalence of dental pathology, as well as the quality of specialized care provided Huang D.L., Park M., 2015]. The data of the literature also testify to the high demand of the population for orthopedic dental care: it has been established that more than 60% of the population of our country aged 35-45 years are in need of dental prosthetics. Patients whose dentures are of poor quality are also among those in need of this type of care. At the same time, the average period of use of orthopedic structures is no more than three years for removable dentures and five years for bridges.

Despite the achievements of modern dentistry, the number of patients with partial and complete loss of teeth not only does not decrease, but also tends to increase, which leads to an increase in the population's need for orthopedic dental care. In the Russian Federation, secondary partial edentulism accounts for 40 to 75% of cases in the overall structure of dental care. Along with the increase in life expectancy of the population in developed countries, the number of people with a complete absence of teeth is growing.

Thus, in the USA, the proportion of elderly patients with total adentia is about 50%, in Sweden - 60%, and in Denmark and the UK the proportion of such patients exceeds 70-75% [Huang D.L., Park M., 2015]. According to the literature, in persons aged 45 years, the incidence of total adentia is 11%, by the age of 55 the proportion of patients with a complete absence of teeth reaches 15%, and in the age group over 60 years - 25% [Baron C. et al., 2018].

The most important task of orthopedic dentistry is the low-traumatic treatment of dentition defects using various designs of dentures (Dolce M.C. et al., 2014]. When choosing the most rational treatment method to achieve functional usefulness and an acceptable aesthetic result, the doctor must offer the patient the best method of treatment.

The degree of the topic development.

At present, the requirements of patients regarding the methods and results of prosthetics of dentition defects have changed. Their attention is drawn to such aspects as the aesthetics of dentures, the biocompatibility of the materials used, the reduction in the amount of preparation of the abutment teeth, and the methods of retaining the prosthesis on the abutment teeth. In this regard, specialists are constantly searching for

optimal methods of prosthetics, comparing existing methods of restoring teeth. Choi YY. et al., 2019; Consolaro A., Romano F.L., 2014]. As the analysis of literature data shows, the effectiveness of treatment is determined not so much by the type and brand of products used, but by a differentiated approach - a rational choice of the design of the prosthesis, its correct manufacture and fixation. [McSwiney T.P. et al., 2017; Giacobbo L.C. et al., 2019].

The conditions of widespread use in the practice of orthopedic dentistry of solid and ceramic-metal prostheses, it is necessary not only to study in detail the causes of unfavorable outcomes of prosthetics and emerging complications, but also to find ways to optimize these structures. All this requires the creation of new approaches to medical tactics in prosthetics of the oral cavity, as well as the introduction of dispensary observation groups in orthopedic dentistry.

Understanding the specifics of the clinical situation, the ability to choose the right design of the prosthesis, mastering the technique of operations and methods of prosthetics, including under adverse anatomical conditions, are the most important factors that characterize the competence of a specialist and determine the high clinical effectiveness of the approaches used. [Giacobbo L.C. et al., 2019; Milosevic A., 2017].

In recent years, there have been more and more reports on the role of disorders in the pathology of the temporomandibular joint (TMJ), the consideration of which is extremely important when planning orthopedic rehabilitation measures. According to various authors, from 27 to 76% of patients who visit dentists complain of dysfunction of the TMJ [Balaji S.M., 2017; Chi W.J. et al., 2017; He H., Liu Z.J., 2019].

It has been shown that chronic stress in the pathology of the TMJ manifests itself in the form of parafunctions and bruxism, which contributes to the feeling of "fatigue" of the masticatory muscles, pain during chewing and their spasm. The role of psychogenic factors in the development of the disease has also been demonstrated. [de Barros Pascoal A.L. et al., 2020; Kretschmer W.B. et al., 2019].

The multifactoriality of the above problem largely determines the structure of the necessary diagnostic and therapeutic measures when planning orthopedic rehabilitation. As part of a comprehensive interdisciplinary approach to diagnosis, it is necessary to use diagnostic research methods with an appropriate evidence base in order to verify the prevalence of neuromuscular or occlusive-articular syndromes, as well as to assess their systemic impact on the biomechanics of the musculoskeletal system [2015; Baad-Hansen L, Benoliel R., 2017; Durham J. et al., 2015; Ghurye S., McMillan R., 2017; Gil-Martinez A. et al., 2018; Huynh N.T. et al., 2011].

Thus, the problem of improving the results of rehabilitation of patients with

various types of dentition defects is highly relevant, which is due to the development of a complex symptom complex of pathological changes in the dentition in this pathology. At the same time, the full functioning of the masticatory apparatus and the integrity of the dentition are the most important component of the quality of human life. Timely orthopedic treatment aimed at eliminating occlusal disorders during deformation of the dentition should include the prevention of deeper changes in the morphological and functional nature of the dental system.

The solution of this problem is a complex interdisciplinary task that requires the interaction of doctors of different specialties in order to comprehensively assess the clinical situation, develop an optimal algorithm for diagnosis and treatment, while works devoted to a comprehensive study of this problem are extremely scarce and not systematized.

The aim of the study is to increase the effectiveness of orthopedic rehabilitation of patients with complete reconstruction of the dentition based on the consideration of individual anatomical, functional and clinical characteristics of the temporomandibular joint.

Research objectives

1. To analyze the anatomical, functional and clinical changes for the patients who need a complete reconstruction of the dentition.
2. To scientifically substantiate the concept of an interdisciplinary approach to carrying out activities of orthopedic dental rehabilitation for the patients with adentia who need a complete reconstruction of the dentition.
3. To study the dynamics of manifestations of orofacial muscle pain and clinical signs of disorders of the temporomandibular joint and the characteristics of occlusion for the patients with adentia, who are undergoing various complexes of therapeutic and rehabilitation measures.
4. Assess the characteristics of occlusion in edentulous patients.
5. Perform a comparative assessment of the clinical effectiveness of the proposed approach to dental orthopedic treatment of patients with adentia in terms of instrumental studies of the state of the temporomandibular joint (according to X-ray examination, condylography, retrusion stability and electromyography).
6. To study the effectiveness of the use of various methods of dental orthopedic rehabilitation in relation to the aesthetic aspects of the state of the dentoalveolar system for the patients with adentia.
7. To carry out a comparative assessment of the dynamics of indicators of interdisciplinary studies (manifestations of obstructive sleep apnea syndrome, quality of life, satisfaction with treatment) For the patients with adentia who undergo various

complexes of therapeutic and rehabilitation measures.

8. To develop clinical guidelines for improving the complex of diagnostic and therapeutic and rehabilitation measures for the patients with adentia, who undergo various complexes of therapeutic and rehabilitation measures.

Scientific novelty

The concept of an interdisciplinary approach to carrying out diagnostic and therapeutic and rehabilitation measures for the patients with adentia who need a complete reconstruction of the dentition, based on the consideration of individual anatomical, functional and clinical characteristics of the temporomandibular joint, has been tested.

The complex of immediate and long-term results of the application in clinical practice of the developed approach to the implementation of therapeutic and rehabilitation measures in this contingent of patients is analyzed.

Based on a seven-year dynamic observation of patients with complex restoration of dentition, the effectiveness of using the author's algorithm for examining and treating patients with total restorations in real dental practice was evaluated.

New data are presented on the features of manifestations of orofacial muscle pain, signs of pathology of the temporomandibular joint and changes in occlusion for the patients with adentia in dynamics against the background of various complexes of therapeutic and rehabilitation measures.

A comparative assessment of the clinical effectiveness of various approaches to dental orthopedic treatment of patients with adentia was carried out based on the results of instrumental studies of the state of the temporomandibular joint according to X-ray examination, condylography, retrusion stability and electromyography.

The aesthetic aspects of the use of methods of dental orthopedic rehabilitation are characterized, the advantage of using an interdisciplinary approach in terms of improving aesthetic characteristics for the patients in need of complete reconstruction of the dentition is shown.

New data were obtained on the dynamics of sleep quality indicators, the level of dental quality of life, satisfaction with the treatment of patients with adentia, who undergo various complexes of treatment and rehabilitation measures.

Theoretical and practical significance of the research

The results of the study made it possible to substantiate the need to use a set of methods for diagnosing the state of the dentoalveolar system when planning the treatment of patients with adentia who need total restoration of the dentition.

The high clinical effectiveness of an interdisciplinary approach to orthopedic

rehabilitation of this category of patients has been demonstrated.

The criteria for evaluating the effectiveness of ongoing rehabilitation measures based on the use of aesthetic and functional characteristics of patients with adentia have been supplemented.

The algorithm of diagnostic and therapeutic tactics in the framework of the total rehabilitation of the dentition for the patients with adentia is substantiated.

Results

1. The concept of an interdisciplinary approach to the treatment of patients with adentia who need a complete reconstruction of the dentition is a pathogenetically substantiated and clinically effective direction of treatment, based on the need to take into account the anatomical and physiological characteristics of the dentoalveolar system in the course of complex planning and treatment of this category of patients.

2. The use of the complex of therapeutic and rehabilitation measures proposed and tested in the work contributes to the fact that For the patients who undergo a complete reconstruction of the dentition, there are statistically significantly lower (relative to the comparison group) levels of pain severity during palpation of the muscles of the maxillofacial area, a decrease the severity of signs of the pathology of the state of the temporomandibular joint and the normalization of the characteristics of occlusion.

3. The use of an interdisciplinary approach to the treatment of patients with adentia who need a complete reconstruction of the dentition contributes to a expressed improvement in the aesthetic characteristics of the maxillofacial area (indicators of facial analysis, ratios of teeth and lips, dental analysis).

4. The implementation of the proposed approach to the implementation of dental orthopedic rehabilitation measures helps to reduce the manifestations of concomitant pathology in this group of patients (sleep characteristics, manifestations of OSAS), improve their quality of life and satisfaction with changes in appearance as a result of the treatment.

5. The complex of diagnostics and examination of patients with adentia in need of complete reconstruction of the dentition should include interdisciplinary studies, including an assessment of the state of the musculoskeletal system, a polysomnological examination of the patient and the study of sleep characteristics, the study of neurological and psychological status, an assessment of the quality of life patient, as well as consultations with related specialists.

Methodology and methods of research

Study design is comparative, open, prospective, randomized in parallel groups.

The study included 647 edentulous patients in need of complete dentition reconstruction, selected according to inclusion and non-inclusion criteria.

Comparative clinical evaluation of the effectiveness of ongoing treatment and rehabilitation measures was performed on the basis of the results of treatment of patients who were divided into groups depending on the approaches to treatment used.

Patients were randomized into 3 groups:

- group 1 (A) - 218 patients treated with standard methods of orthopedic dentistry;
- group 2 (B) - 195 patients, in the treatment of which individual elements of an interdisciplinary approach to dental orthopedic rehabilitation were applied;
- group 3 (C) - 234 patients treated with the proposed interdisciplinary approach to dental orthopedic rehabilitation.

Methods of clinical examination, instrumental and questionnaire research methods were used. The observation of patients included in the study was carried out for 7 years, the studied parameters were evaluated before the start of orthopedic treatment and during further observation after 1, 3, 5-7 years.

Implementation of research results into practice

The results of the work have been introduced into the clinical practice of the clinic's specialists. We personally examined and treated 647 patients with adentia who needed a complete reconstruction of the dentition. During the study, patients were followed up for 7 years. The analysis of the results obtained and their statistical processing were independently carried out, on the basis of which the author formulated the provisions submitted for defense, conclusions and practical recommendations.

CHAPTER 1. FEATURES OF ORTHOPEDIC TREATMENT AND REHABILITATION OF PATIENTS WITH COMPLEX RECOVERY DENTITION (REVIEW OF LITERATURE)

1.1 Dental morbidity and need for orthopedic treatment of the population of the Russian Federation

In the Russian Federation, secondary partial adentia accounts for 40 to 75% of cases in the overall structure of dental care. It is noted that the prevalence of this pathology and the number of missing teeth correlate with age. Along with the increase in life expectancy of the population in developed countries, the number of people with a complete absence of teeth is growing.

So, in the USA the proportion of elderly patients with total adentia is about 50%, in Sweden - 60%, and in Denmark and the UK the proportion of such patients exceeds 70-75%. According to the literature, in persons aged 45 years, the incidence of total adentia is 11%, by the age of 55 the proportion of patients with a complete absence of teeth reaches 15%, and in the age group over 60 years - 25% [Horwitz J., Gabay E., 2012].

Among the causes leading to loss of teeth, the most important are: carious lesions of the teeth, complications of caries, periodontal disease, injuries of the teeth and jaws, chemical (acid) necrosis of hard tissues of the crowns of the teeth, surgical interventions for chronic inflammatory and tumor processes

There are also cases of primary adentia, the cause of which is a defect of embryogenesis or the process of eruption, which leads to the formation of impacted teeth.

Defects in the dentition contribute to the development of anomalies and deformities of the dentition. With the loss of the chewing group of teeth, a defect of the ratio of the dentition is often observed, which is clinically manifested by a displacement of the lower jaw. The development of structural and functional changes in the temporomandibular joint is also noted, which is due to its close relationship with the neuromuscular apparatus of the dentoalveolar system and the nature of the closure of the dentition.

Loss of teeth can lead to social maladjustment of a person. According to the literature, the attitude of the patient to this problem differs significantly in people of different ages. Middle-aged patients painfully experience the loss of teeth, often they experience embarrassment in communicating with others, a feeling of inferiority, defectiveness, depressive states. In old age, patients have a calmer attitude towards adentia. Studies of domestic and foreign scientists have revealed a serious impact of complete or partial adentia on the quality of human life.

Thus, dental anomalies and defects in the dentition are an extremely urgent problem in modern dentistry. The high prevalence of pathology and its negative impact on the quality of human life require a solution to this problem.

1.2 Anatomical and topographic features of the structure of the jaws with disorders of the dentition

Loss of teeth inevitably leads to structural, functional and aesthetic disorders in the maxillofacial area, psycho-emotional shifts, contributes to the development of systemic pathology, social maladjustment, associated economic costs, that is, reduces the quality of human life.

It has been proved that the close interaction of the dentition plays an important role in the unity of the dentoalveolar system in morphological and functional terms. Their integrity is a necessary condition for the physiological functioning of the oral cavity. In the presence of dentoalveolar anomalies, chewing function, speech, and aesthetics are disturbed. The absence of even one tooth has a negative impact not only on the function of the dentition, on the psychological state of a person, but also on the whole organism as a whole.

As a result of tooth loss, the process of chewing food is primarily disrupted, which has a negative effect on digestion. The absence of teeth inevitably has a negative impact on the articulation, diction and communication ability of the patient, which does not affect his psycho-emotional state. The teeth, devoid of antagonists, and the bone surrounding them gradually move in the direction of the missing antagonists of the opposite jaw.

The presence of defects in the dentition over a long period leads to a distal displacement of the lower jaw, as a result, the function and topography of the temporomandibular joint and the activity of the neuromuscular apparatus are disturbed. Total adentia leads to expressed changes in the facial skeleton.

Significant morphological and functional changes in the dentition that develop during adentia progress with an increase in the defect and the time elapsed since the loss of teeth.

As a result of partial adentia, untimely orthopedic treatment, against the background of emerging traumatic occlusion, chewing pressure forces lead to the formation of deformations of the dentition as a result of the migration of individual teeth or their groups. In the absence of timely interdisciplinary treatment, the deformities progress, which in turn leads to a defect of the sliding of the dentition, movements of the lower jaw in one or more planes, and myodynamic imbalance.

The result of adentia is also the formation of chronic foci of infection, atrophy of the alveolar processes and a decrease in the volume of the jaw bones]. A progenic ratio

of the jaws is formed, the ratio of the alveolar processes in the lateral parts of the jaws changes, the depth of the oral cavity is significantly reduced or the vestibule of the oral cavity is completely absent, to a decrease in the intensity of blood circulation, osteoporosis and bone atrophy, reduces osteogenic potency and activates the process of bone resorption, which leads to partial or even complete atrophy of the alveolar processes of the jaws.

The mucous membrane with partial or total adentia also undergoes changes and differs from that with intact dentition according to morphological, microbiological and immunological criteria. With adentia, the composition and properties of the oral fluid also change

Reducing the load on the alveolar processes induces atrophy of the latter, which contributes to the development of defects of the biomechanics of the temporomandibular joint.

Thus, the presence of dentoalveolar anomalies and defect of the integrity of the dentition inevitably leads to a disruption in the functioning of the entire dentoalveolar system, which dictates the need for timely diagnosis and correction of dentoalveolar anomalies and restoration of the dentition.

1.3 Methods of orthopedic treatment of patients with dentoalveolar anomalies and defects of the dentition

The most important task of orthopedic dentistry is the low-traumatic treatment of dentition defects using various designs of dentures. [Chen J. et al., 2014]. When choosing the most rational method of treatment to achieve functional usefulness and an acceptable aesthetic result, the doctor is obliged to offer the patient the best method of treatment.

Undoubtedly, the improvement of the oral cavity through the use of modern highly effective methods of treatment of dental diseases, providing a long-term effect of dental health, has a positive effect on overall human health, life expectancy and working capacity of the population, is one of the elements of the overall health and welfare of society.

1.4 Frequency, etiology and classification of complications of orthopedic treatment of patients with partial or complete absence of teeth

Evaluation of prostheses is often carried out on the basis of long-term results of orthopedic treatment. the main complications that developed when using complete removable lamellar dentures: plaque on the denture (65%), mechanical damage to the dentures (38%), pressure ulcers of the mucous membrane of the prosthetic bed (70%),

dietary restrictions - the exclusion of certain products from the diet of patients) (53%), imprints of the edges of the prosthesis on the mucous membrane of the prosthetic bed (43%), phonetic disorders, in particular, the difficulty of pronouncing whistling, hissing sounds (37%), difficulty in chewing food (28%), food getting under the prosthesis (21%).

The analysis of the features of the use of complete removable lamellar dentures made it possible to characterize the main disadvantages of these structures, in particular, the absence of multicolored artificial teeth (100%), the presence of artificial transverse palatine folds (97%), alveolar elevations (68%), and the relief of the gingival margin (34.7%), The author also draws attention to the presence of gaps around artificial teeth (79%), the relatively low quality of modeling (61%) and aesthetics of prostheses (46%)].

Attempts were made to assess the condition of prostheses, taking into account the features of their designs, contamination with microorganisms, the impact of occupational hazards for the patients on the state of prostheses, as well as the effect of prostheses on the tissues of the prosthetic bed]. As local factors of the negative effect of removable dentures on the periodontium, their mechanical effect is considered: first of all, the effect of reduced pressure under the basis of the prosthesis on the oral mucosa, including the gingival margin of the remaining teeth. In addition, injuries of the gingival margin often develop with the retaining shoulder of the clasp during swallowing and chewing, as well as injuries of the interdental papilla and gingival margin, which are caused by the basis of a removable prosthesis.

In cases of irrational arrangement of the supporting elements of the prosthesis, when using rigid locking fasteners, end defects of the dentition may form; in the absence of occlusal contacts in the area of natural teeth, the negative effect of removable dentures increases.

The most common cause of damage to the oral mucosa is a chronic mechanical injury, including a partial removable denture.

According to, Van Velzen F. et al. (2014) the rate of successful implantation was 91.6% of cases, but further 10-year follow-up showed that 7% of patients develop peri-implantitis. Other authors, presenting the results of prosthetics over a 10-year period of activity, indicate that, depending on the type of prosthesis and the time elapsed after its installation, the frequency of successful prosthetics is from 65 to 93%.

Bert M. et al., (2007) divide the complications of orthopedic treatment into mechanical, biological, aesthetic, functional etc.

Complications that develop during implantation, as well as during the functioning of prostheses, to complications of the surgical stage and the orthopedic stage. According to the author, surgical complications should be classified as early, developing within 1 month after surgery, and late, occurring more than 1 month later,

but before the second stage of implantation (after 3–6 months).

The factors contributing to the failure of prostheses in dental practice include: imbalance of occlusal force, smoking, condition of the bone tissue, defects and errors during the operation, including injuries, inadequate design of the prosthesis, non-compliance with the rules of oral hygiene, the presence of concomitant diseases, in particular, diabetes and others.

A bacterial infection is considered as the most important factor in the failure of the prosthesis, while the microbiota includes Prevotella intermedia, Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans, Bacterioides forsythus, Treponema denticola, Prevotella nigrescens, Peptostreptococcus micros, Fusobacterium nucleatum and a number of other microorganisms that cause peri-implantitis(Arisan V. et al., 2015; Canullo L. et al., 2015; Chung S.H. et al., 2013; Dalago H.R. et al., 2016; Hanaoka M. et al., 2014; Smeets R. et al., 2014].

Bacteria are a key etiological factor in periodontal disease, thus, the composition of the microbiota in the areas surrounding the implant has a significant impact on the further state of this area [Mombelli A. et al., 2012]. Submucosal microflora in areas with clinically healthy margins surrounding implants, as a rule, is represented by gram-positive cocci and bacillus [Belibasakis G.N. et al., 2015].

P. gingivalis is the most actively studied microorganism in terms of peri-implantitis research [Bouazza-Juanes K. et al., 2015]. It is an anaerobic Gram-negative bacterium with a variety of virulence factors, including proteases, fibrin, and lipopolysaccharide. All these factors together allow these bacteria to cause peri-implantitis by penetrating the host cells, causing an inflammatory reaction and destruction of the extracellular matrix and bone tissue. [De Waal Y.C. et al., 2015]. The etiology of peri-implantitis is similar to that one of periodontitis. In this regard, the treatment of the disease is similar and consists mainly in the appointment of antibiotic therapy. [Dhima M. et al., 2013].

Peri-implantitis is characterized by the involvement of soft and hard tissues in the inflammatory process, which leads to loss of bone tissue and the formation of a pocket around a functioning intraosseous implant [Feller L. et al., 2012; Frome S.J., Rosen P., 2012; McCrea S.J., 2014]. This condition eventually leads to resorption of the alveolar bone tissue. Peri-implantitis is the cause of failure of dentures in 10-50% of cases within 1 year after implantation [Esposito M. et al., 2012].

Of course, a wide variety of complications of prosthetics requires their comprehensive analysis in order to develop preventive measures and improve the effectiveness of treatment. [Babbush C.A. et al., 2013].

1.5 Main criteria and methods for evaluating performance of the orthopedic treatment. Quality criteria for used orthopedic constructions

The effectiveness of orthopedic treatment of patients with dentition defects is determined both by the technologies used in the treatment process and by the level of complex functioning of the organs and systems of the dentition and orthopedic structures.

A variety of approaches to assessing the medical effectiveness of orthopedic treatment have been described: clinical, clinical and statistical, clinical and radiological, functional, and others [Nechaeva N.K., 2010; Paraskevich V.L., 2006; Yarulina Z.I., 2010; Chen X. et al., 2008].

In 1978, at the Harvard Conference, the use of the following indicators was recommended as criteria for the effectiveness of dental implantation:

- mobility of implants (less than 1 mm in each direction);
- X-ray picture of bone loss (less than one third of the length of the implant);
- clinical signs of therapeutically easily eliminated gingivitis;
- absence of pathological changes in the nerves, maxillary sinuses, nasal cavity;
- no symptoms of infection;
- efficiency at the level of 75% after 5 years [Casap N. et al., 2004].

Subsequently, these criteria were refined and expanded, becoming generally more stringent, namely:

- lack of clinical mobility of single and non-blocked implants;
- absence of radiological peri-implant changes;
- average bone loss less than 0.2 mm one year after implantation;
- absence of pain sensations, neuropathies and paresthesias;
- absence of infectious complications;
- no damage to the nerve channels;
- aesthetic satisfaction with rehabilitation [Vasiliev A.Yu. et al., 2008; Nechaeva N.K., 2009; Serova N.S., 2010; Sirak S.V. et al., 2015; Di Lallo S. et al., 2012].

In 1989, Smith D. and Zarb G. proposed the other, more stringent evaluation criteria, according to which 85% or more implants placed after 5 years, and after 10 years, at least 80% of implants should be clinically stable, and the rate of bone loss, according to the researchers, should be less than 0.2 mm/year.

It is believed that the criteria for assessing the rate of bone loss should be X-ray data one year after implantation. In this case, a loss of bone tissue during the first year up to 1.0 mm is allowed. The cause of bone resorption in this period after the installation of implants is usually the second stage of the operation, after which the microcirculation in the area of the crest of the alveolar process changes for some time.

The functional load on the implant contributes to the structural restructuring of

the bone, starting with its resorption. Resorption in the area of the alveolar crest, where the implant is located, up to 1 mm, is a tissue response to the intervention.

A number of researchers suggest using laboratory and instrumental methods for assessing the functional state of the implant, in particular, determining bone density (densitometry), ultrasound diagnostics, studying gingival fluid parameters, functional tests, gnathodynamometry, etc., however, the use of these methods seems problematic in everyday clinical practice [Slabkovskaya A.B., Panaiotov I.P., 2014; Stafeev A.A. and et al., 2007; Abdelhamid A. et al., 2016].

Doppler ultrasound and laser Doppler flowmetry (LDF) can also be used as treatment monitoring methods. Doppler ultrasound is a non-invasive method for assessing areaal blood flow, based on the effect of changing the frequency of the reflected signal from a moving object (Doppler effect). hemodynamic characteristics.

The possibilities of ultrasound dopplerography contribute to improving the efficiency of diagnosis and provide the possibility of monitoring the process of treatment of periodontal diseases.

The technique of laser Doppler flowmetry in the last decade has been increasingly used to assess the state of blood flow in microvessels. Using this method, the early stages of inflammatory periodontal diseases are assessed, which are primarily based on microcirculation disorders [Belokopytova VV, 2002; Kulakov A.A. et al., 2014]. The use of instrumental testing of microcirculatory disorders in clinical practice makes it possible to diagnose early manifestations of pathology.

LDF allows not only to evaluate the overall level of peripheral perfusion, but also to identify the features of the state and regulation of blood flow in the microvasculature. Capillary blood flow is characterized by a microcirculation index (PM), which is recorded over a certain period of time by a device specially designed for this purpose. The essence of the method is a low-intensity monochromatic light beam, which is emitted by a laser diode built into a Doppler laser flowmeter, passing through a flexible light guide and illuminates the area of biological tissue under study through the sensor tip.

Reflection occurs, and part of the light falls on the internal photodetector of the device. Moving particles - in this case, red blood cells - cause a frequency shift in accordance with the Doppler effect. The received signal is processed in accordance with the embedded algorithm. The advantages of the method are: non-invasiveness, high information content, objectivity and the ability to assess the state of the blood supply to the pulp of the tooth and periodontium.

The most important method for assessing Osseo integration when using dental implants is radiological, which is widely used to determine the optimal timing for the start of orthopedic treatment, assess the results of prosthetics in dynamics and identify treatment complications (Benlidayi M.E. et al., 2011]. When conducting an X-ray

examination in the practice of dental implantation, panoramic radiography, cephalometric radiography and intraoral radiography are most often used.

In the general statistical analysis of the long-term results of implantation, the starting point is 1 year after prosthetics, thus, in many studies, the results of the surgical stage of treatment are not taken into account. Thus, a complex statistical indicator of the effectiveness of implantation does not always correspond to such a parameter as the "survival" of the implant. [Dohan Ehrenfest D.M., Rutkowski J.L., 2012; Duttenhoefer F. et al., 2013; Holmes J.D., Aponte-Wesson R., 2010; Javed F., Romanos G.E., 2015].

Currently three-dimensional dental computed tomography with programs for mathematical modeling of implantation is widely used. [Al-Ekrish A.A., 2012; Asa'ad F. et al., 2016; Joda T., Gallucci G.O., 2015; Rebaudi A. et al., 2010]. When drawing up a plan for dental prosthetic treatment, X-ray templates are also used to help select an implant of the appropriate type, diameter and length. When assessing bone tissue, its volume and density are taken into account at the intended site of implant insertion [Arnhart C. et al., 2012; Feuerstein O. et al., 2006; Bornstein M.M. et al., 2015].

The state of the bone of the alveolar process of the jaw is usually classified according to 2 parameters: density and biological features (osseointegration) [Ivanov A.S., 2011]. The structure of the cancellous bone is diverse and can be divided into 2 zones: upper and lower. In the upper zone, the bone beams are located horizontally, along the length of the alveolar part of the jaw [Lebedenko I.Yu. and et al.,

2009; Kim J.H. et al., 2013]. The classification that takes into account 4 degrees of bone density is currently used. [Laurell L., Lundgren D., 2011]:

- D1 - cortical bone (bone is dense and homogeneous). The ratio of compact and spongy layer is 2:1;
- D2 - dense cortical-cancellous bone (the cortical plate is quite thin, and the cancellous bone is quite dense). The ratio of compact and spongy layer is 1:1;
- D3 - loose cortical-cancellous bone (the cortical plate is very thin, and the cancellous bone is porous). The ratio of compact and spongy layer is 0.5:1;
- D4 - spongy bone (cortical plate is not defined; thin cortical layer with very porous spongy substance). The ratio of compact and spongy layer is 0.5:1.5.

Due to the frequent cases of traumatic bone resorption and loss of its volume from the buccal side after tooth extraction, dental implantation is often supplemented by interventions to restore the volume of bone and soft tissues; Horzeler M.B. et al., 2010]. The purpose of these procedures is not only to restore the lost structures, but also to give the implant the correct prosthetic position. It has been proven that the position of the implant, the quality and condition of the surrounding tissues are of great importance for achieving biologically and aesthetically acceptable stable results. [Aliaga I.J. et al., 2015]. In turn, the aesthetic effect of treatment depends on a number

of factors that have received little attention so far.

The studies of many authors have proved that the level of mineral saturation of the bone tissue directly depends on the size of the defect in the dentition and the functional load. [Clementino-Luedemann T.N., Kunzelmann K.H., 2006]. Prosthetics with fixed structures, restoring the integrity of the dentition, allows you to fully normalize the functional load and positively influence the level of mineral saturation of the jaw bones [Pisarevsky I.Yu. et al., 2012].

Atrophic processes in the bone tissue can be enhanced due to concomitant somatic and systemic diseases, and individual morpho structural features of the jaws formed during ontogenesis can also create certain conditions for the activation of the atrophic processes.

In real clinical practice, patients, as a rule, who apply for this type of dental care, are people of older age groups who have somatic diseases or abnormalities: endocrine disorders, cardiovascular pathology, etc. A large proportion of this are women, which naturally marked age-related changes in hormonal levels. It is well known that the ongoing endocrine restructuring of the menopause period contributes to the development of an imbalance in the processes of mineral metabolism, manifestations of various microelementoses. These pathological conditions are an important factor in the formation of postmenopausal osteoporosis and often cause the inefficiency of the use of various types of prostheses. With age-related "turning off" of ovarian function, 60-80% of women have various clinical signs of estrogen deficiency - functional disorders, which include menopausal osteoporosis, it accounts for 85% of osteoporosis in the structure of this pathological condition. Manifestations of bone demineralization in 52 patients with secondary amenorrhea (age 26–46 years), as well as in women who underwent oophorectomy (37–62 years) and with natural menopause (45–68 years). The authors included women with normal ovarian function in the control group. It was found that changes in the periodontium were accompanied by severe atrophy of the bone tissue of the alveolar part (process). The authors emphasize that osteoporosis is often accompanied by atrophy of the alveolar processes of the jaws, which can serve as an additional diagnostic sign of low bone mineral density.

According to most researchers, at present it can be argued that a decrease in the mineralization of the skeleton is accompanied by an increase in the manifestations of pathological changes in the hard tissues of the teeth and periodontium. At the same time, there are few reports in the available literature on identifying the nature of the relationship between the development of osteopathy and changes in the tissues of the dentoalveolar apparatus.

It should be noted that in the available literature there are single works devoted to the assessment of quantitative and qualitative disorders of mineral metabolism, bone metabolism and remodeling processes in relation to the problem of planned orthopedic

treatment. Nevertheless, a number of authors are considering the possibility of using densitometry for this, a set of methods that include various approaches to image acquisition and its quantitative analysis for assessing bone mineral density.

The relevance of the search for effective diagnostic methods of this kind is due both to the significant influence of the state of the jawbone on the functioning of the dentition, and also to the fact that changes in metabolism, hormonal status, local immunity and a decrease in bone density lead to osteoporotic changes that significantly reduce the effectiveness of treatment Various options for bone densitometry are offered for use in clinical practice It has been demonstrated that bone tissue densitometry, performed on the basis of digital orthopantomogram data, is a diagnostically informative available research method that should be used to assess the state of the jaw bone tissue and monitor the effectiveness of the treatment. [Kalra M. et al., 2013; Luangchana P. et al., 2015].

A number of researchers believe that the final result of prosthetics, evaluated according to statistical data, cannot be accepted as a standard for evaluating the effectiveness of the method in different clinical situations. Therefore, in order to exclude distortions of the results, the analysis of treatment results should be carried out differentially, taking into account the specific clinical situation. For example, there is an opinion that 88-99% of failures in the implementation of dental implantation are to some extent problems of the orthopedic stage of treatment. [Sanchez-Siles M. et al., 2014].

In contrast to other areas of medical practice in dentistry, indications and contraindications for the use of various methods of treatment involve a choice.].

Understanding of the features of the clinical situation, the ability to choose the right design of the prosthesis, knowledge of the technique of operations and methods of prosthetics, including under adverse anatomical conditions, are the most important factors that characterize the competence of a specialist and determine the high clinical effectiveness of the approach used.

In the conditions of widespread use in the practice of orthopedic dentistry of solid and ceramic-metal prostheses, it is necessary not only to study in detail the causes of unfavorable outcomes of prosthetics and emerging complications, but also to find ways to optimize these structures. All this requires the creation of new approaches to medical tactics in prosthetics of the oral cavity, as well as the introduction of dispensary observation groups in orthopedic dentistry.

Aesthetic disorders of the anterior teeth caused by increased abrasion, caries, acute or chronic trauma are eliminated with the help of ceramic or metal-ceramic prostheses. This requires a radical preparation of the abutment teeth, which dramatically increases the risk of pulp necrosis or requires preliminary preparation.

Due to low color stability, high shrinkage and porosity associated with the

mechanical properties of the material, composite fillings and veneers (semi-crowns) are used more limitedly than required by clinical practice. In this situation, the use of adhesive ceramic prostheses, occupying only a tooth defect, allows in a significant number of cases to solve the aesthetic and functional problems of patients in the most effective way, while maintaining the viability of the pulp and the durability of the supporting teeth.

Adhesive ceramic veneers for anterior teeth were only described in 1975 in France by A.L. Rochette. He described the technique of prosthetics with porcelain constructions when restoring incisors after traumatic chips. Ceramics were fired in the laboratory on a matrix of pure gold. Etched enamel and silane-treated porcelain were held together with composite resin. Taking into account modern experience, it is obvious that the approach of Rochette A.L. was prophetic. From this technique, ceramic veneers developed and became popular in Europe. [Garber D.A. et al., 1988].

A method of preparing teeth for adhesive lining, proposed by Garber D.A. et al. (1988) is known. Its essence lies in the formation of first horizontal grooves on the vestibular surface of the tooth, and then uniform grinding of the remaining tissues from the entire vestibular surface, going to the contact surfaces, the cutting edge and the oral surface of the tooth. However, the disadvantage of this method is the radical preparation of the hard tissues of the teeth and, accordingly, the traumatic effect on the pulp and its inadequate isolation.

A method for preparing a tooth for adhesive lining is also described, including the preparation of hard tooth tissues to a thickness of 0.5 to 1.5 mm, characterized in that horizontal and then vertical grooves are first formed on the vestibular surface of the tooth at a distance of 2.5 mm one after another, going to the cutting edge and oral surface, followed by grinding of the remaining areas, going to the contact and oral surfaces, the cutting edge. Despite the change in methodology, this method is also invasive, which entails pulp injury and related complications.

When using traditional approaches in treatment (full artificial crowns) that require the excision of a large volume of hard tissues of the tooth, a negative effect on the pulp, gums, and mechanical strength of hard tissues is provoked. At the same time, dentinal tubules open, through which fluid flows from the cavity of the tooth and infection enters the pulp.

There is an urgent need for a simple clinical system for examining the quality of sound production and speech.

Dental anomalies, as well as partial loss of teeth, are often accompanied by deformations of the occlusal surface of the dentition.

There are several causes of occlusion disorders, namely: many dentoalveolar anomalies, dentoalveolar elongation, mesial or distal tilt of the teeth, distal or lateral shifts of the mandible and, finally, the mutual combination of these factors The

question of which of these causes are leading, cannot be solved only by clinical studies and the study of diagnostic models of the jaws. In most patients, it is necessary to analyze the lateral teleroentgenogram (TRG) of the head to detect changes in the structure of the facial skeleton.

TRG makes it possible, in addition, to judge the magnitude of the movement of the teeth, the curvature of the occlusal surface of the dentition, compare the dentoalveolar height with the height of the alveolar process and thereby clarify the shape of the dentoalveolar elongation. When the teeth are tilted, TRG allows you to determine the thickness of the layer of dental tissues to be ground off in order to be able to apply a removable prosthesis or, having determined the invasiveness of the operation, choose another method of prosthetics, including a removable demountable bridge prosthesis.

TRG allows you to find out whether occlusion disorders are caused by distal displacement of the mandible or dentoalveolar lengthening. In the first case, signs of distal displacement of the lower jaw are clearly defined on TRG, and there are no signs of dentoalveolar changes. In the second case, the lower jaw occupies its usual position, but along with this, dentoalveolar elongation takes place. And, finally, a third option is possible, when the distal displacement of the lower jaw is accompanied by dentoalveolar lengthening.

This, firstly, helps to restore the aesthetics of the patient's appearance, and secondly, the convenience of using dentures and increasing the efficiency of chewing. Thirdly, there is a genetically determined dynamic stereotype of the function of the masticatory apparatus. This activity is based on the connection of orientation in the skull of the formed individual occlusal surface of the dentition, which creates the functional optimum of the temporomandibular joints and masticatory muscles. Therefore, the search and design of the proper occlusal plane is an important task assigned to the prosthodontist.

In the early stages of functional disorders of the joint before the onset of serious symptoms, various occlusal disorders are important diagnostic signs Sestac J., Takac L., 1984].

The assessment of the movement of the lower jaw on the basis of graphic methods of their registration (intra- and extraoral) was carried out

One of the most modern methods for an objective quantitative and qualitative assessment of acoustic noise is spectroaudiometry, which allows recording joint sounds with their simultaneous recording on an oscilloscope. area of the TMJ, in front of the tragus of the ear.

Electromyography (EMG) is used to study the function of the neuromotor apparatus and evaluate the coordination of the masticatory muscles. It was found that the electromyogram of masticatory muscles during voluntary mastication is normally

characterized by intermittent activity of the muscles of the same name, the coordinated function of antagonists and synergists, a clear change in the phases of activity and rest during one masticatory movement, which is not observed in defect of the TMJ. Against the general background of a decrease in the amplitude indicators of the electromyographic activity of the masticatory muscles, their asymmetry is observed. On the working side, it is higher than on the balancing side.

X-ray diagnostics of functional disorders of the TMJ includes various methods of examination. These include: survey radiography with special styling, tomography, contrast arthrography, orthopantomography, X-ray cinematography, computed tomography, magnetic resonance imaging.

In most cases, computed tomography can successfully replace arthrography, arthroscopy, and any similar study. However, in the case of perforation of the articular disc, arthrography is preferred. [Helms C.A. et al., 1984].

Comparison of computed tomography and arthrography on autopsy samples of the TMJ (macroscopic preparations) showed that with computed tomography, the diagnostic accuracy in determining the position of the articular disc was 40%, and in determining its configuration - 26.7%. During arthrotomography, the accuracy in determining the position of the disc was 75.6%, and its configuration was 60%. The authors noted that arthrotomography is more informative for diagnosing changes in the articular disc than computed tomography. [Tanimoto K. et al., 1989].

The reliability of computed tomography regarding the visualization of the articular disc of the TMJ causes conflicting opinions. However, if the articular disc was visualized during computed tomography, then there was a good agreement between the diagnosed position and shape of the articular disc and the data of the corresponding histological pictures [Leven I.I., Petrov E.A., 2004].

Technological advances in the field of equipment and software for computed tomography have led to a radical expansion of the scope of this X-ray method. Computed tomographs with spiral scanning appeared. The advantages of spiral computed tomography are the possibility of obtaining an image of an object on a single slice in a short examination time and a reduction in the dose of absorbed radiation, as well as a better image quality.

Computed tomography can be used when planning a surgical intervention - the introduction of implants. At the same time, computed tomography of the jaws was carried out with obtaining transverse images perpendicular to the curvature of the alveolar process [Westesson P.L., 1996].

Magnetic resonance imaging provides new diagnostic possibilities. One of the first domestic specialists for the first time used MRI for the diagnosis of TMJ disorders was used by A.P. Dergilev (1997), later reported by other authors

The use of magnetic resonance imaging makes it possible to obtain high-quality

images of the articular disc, ligaments, muscles, bone elements in one picture, which significantly increases the possibility of diagnosing disorders of the temporomandibular joint.

Special dental treatment measures for the patients with pathology of the masticatory-speech apparatus include correction of occlusion and the use of orthopedic structures (splints, mouth guards, separating plates, etc.) to normalize occlusal disorders

For orthopedic treatment, due to the posterior position of the head of the lower jaw in the articular fossa, in order to normalize its position, temporary bite plate devices are used [Kinzinger G. et al., 2007; Weinberg L.A., 1983].

Occlusal splints were used to restore the occlusal height, the central position of the heads of the lower jaw in the articular fossa, taking into account the results of a functional analysis for each patient.

The reduction of pain in masticatory muscle hypertension with soft (elastic) splints suggested that they did not cause occlusal disorders. This is an effective but short-lived method of treatment [Wright E. et al., 1995]. The use of intraoral splints is advisable for parafunctions of masticatory muscles (muscle spasm, bruxism, bruxomania).

However, assessing the quality of the result of prosthetics is one of the most difficult tasks, since, firstly, it is influenced by many factors (in addition to the level of assistance provided), and, secondly, it is quite difficult (especially in dentistry) to determine the performance criteria.

In the context of the provision of dental care by medical organizations of various forms of ownership and the development of legitimacy in the provision of paid services, which include orthopedic dental care, it is important to develop an examination of the quality of dentures of various designs. When assessing the quality of orthopedic dental care, indicators of the volume of work performed for a certain period by a doctor, a dental technician, a department, a laboratory, an institution as a whole, institutions of a district, city, area, etc. are important.

A number of researchers evaluate the quality of dental and jaw prostheses and the materials from which they are made, according to their color fastness and staining with food juices [Jahangiri L. et al., 2002]. Most often, the assessment of prostheses is carried out on the basis of long-term results of orthopedic treatment.

At the same time, a comparative assessment of various materials, design features, methods and technologies is widely used.

Criteria of the California Dental Association (marginal fit, anatomical shape, color, surface) were used by Sjogren G. et al. (1999) for the evaluation of ceramic (Dikor) crowns. Similar characteristics, including the thickness of the walls of artificial crowns, the presence of secondary caries, were used by other authors, for example,

Haselton D.R. (2000).

Similar indicators appear when assessing the quality of fillings [Rudd R.W., Rudd K.D., - 2001] temporary prostheses [Buergers R. et al., 2007], facings (vestibular semi-crowns), various designs of removable dentures [Fradeani M. et al., 2005].

The criteria for evaluating the activities of the dental institutions contain a number of indicators that summarize the technical and economic level of the dental laboratory and its products, as well as a list of equipment with medical equipment (dental equipment, equipment for a physiotherapy room, an office of functional research methods), a list of mandatory instrumental research methods

Thus, despite the rather wide coverage of the problem under consideration in the special literature, a number of important issues regarding fixed dentures have not yet been resolved. First of all, this is a clear idea of their functions and purpose, and, therefore, indications for their use. And the second important point is the development of characteristics of these replacement structures and, in accordance with this, an assessment of their quality, which, by the way, is at the initial stage of development for all types of prostheses.

1.6 Temporomandibular joint disease for the patients with dentoalveolar anomalies and adentia: features of diagnosis and treatment

The temporomandibular joint is one of the most actively functioning joints of the human body. The complexity of its anatomical structure and biomechanics determines the high incidence of its dysfunction, while the pathology of the TMJ often acts as a starting or supporting factor in the development of systemic pathology, primarily rheumatic diseases [Petrosov Yu. A. 2007].

Currently, the following nosological forms of TMJ diseases are distinguished: dysfunctions (muscle-articular and pain), arthritis, arthrosis, ankylosis, tumors [Cohen-Levy J. et al., 2013].

As the main reasons for the development of disorders of the musculo-articular complex, two groups of factors are considered - occlusal-articulatory and psychogenic. The causes of arthrosis, arthritis and ankylosis in most cases are systemic diseases, metabolic disorders, infections, their development can also provoke injuries. Structural and functional changes in the TMJ can also develop in general pathology. According to various authors, from 27 to 76% of patients who visit dentists complain of dysfunction of the TMJ.

The most important role in the development of TMJ diseases is played by occlusion anomalies, which account for components from 34 to 87% in the structure of this pathology. Currently, most authors believe that the abnormal ratio of teeth is manifested not by morphological features of the elements of the joint, but by changes

in intra-articular relationships. Occlusion-induced changes in the articular surfaces and capsule of the TMJ exacerbate age-related changes, creating anatomical prerequisites for the development of its dysfunction

It has been established that in 70–89% of cases, TMJ pathology is not associated with inflammatory processes, but is a functional articular disorder caused by changes in soft tissue elements: disc, posterior disc zone, capsular-ligamentous apparatus, lateral pterygoid muscles. It should be noted that there is not always a clear relationship between the pathology of occlusion and the temporomandibular joint. However, it is known that the normalization of the occlusion of the teeth improves or favors the physiological functioning of the articular elements.

It has now been established that bone resorption of the condylar process of the mandible can develop with systemic and local arthritis, with post-traumatic joint remodeling, in cases of hormonal imbalance, and also be the result of surgical treatment. [Gunson M.J. et al., 2009; Mercuri L.G., 2008]. In the absence of an obvious cause of resorption of the condylar process of the TMJ, the pathological process is called idiopathic. Its main manifestations are: facial asymmetry and malocclusion

TMJ diseases and maxillofacial anomalies (anomalies of the dentoalveolar system - DAS) are a very common pathology that contributes to the development of functional and aesthetic disorders for the patients accompanied by difficulty eating, impaired respiratory function and obstructive sleep apnea syndrome (OSAS). Flores-Mir C. et al., 2013; Islam S. et al., 2015; Pirklbauer K. et al., 2011]. (OSAS) is a condition characterized by the presence of snoring, intermittent collapse of the upper respiratory tract (URT) at the level of the pharynx and cessation of pulmonary ventilation with continued respiratory effort, decreased blood oxygen levels, gross sleep fragmentation, and excessive daytime sleepiness. In terms of the frequency of occurrence of respiratory disorders, OSAS ranks second and is second only to asthma. [Brunzini A. et al., 2018; Holley A.B. et al., 2011; Katyal V. et al., 2013].

Epidemiological studies conducted in our country and abroad indicate a high prevalence of TMJ diseases in various population groups. To date, it has been established that anomalies of the TMJ play a crucial role in the pathogenesis of TMJ diseases. According to various researchers, TMJ pathology for the patients with congenital malocclusion ranges from 34 to 87%, while women account for 70-82% of the total sample of these patients.

The most important role of maxillofacial anomalies in the development of OSAS is confirmed by reports that mandibular deficiency and an increase in the anterior-lower face height are predisposing factors in this pathology [Di Francesco R. et al., 2012; Giannasi L.C. et al., 2013; Tomonari H. et al., 2017]. The results of the studies indicate that for the patients with class II DAS, OSAS is observed more often than for the patients with classes I and III. [Balaji S.M., 2017].

Taking into account the data of recent years, obtained as a result of studies conducted using modern diagnostic methods in a significant group of patients, class II DASJ is combined with idiopathic resorption of the condylar process of the TMJ - a specific condition also known as idiopathic condylar process lysis, condyle atrophy and progressive resorption of the condyle. The disease was first recorded and described by Burk in 1961. [Burke P.H., 1961], however, to date, this pathology, observed in 9 out of 10 cases in women, has not been studied enough [Kobayashi T. et al., 2012].

An urgent task is to restore adequate external respiration, eliminate the causes that cause such disorders in this category of patients. The literature describes many methods of surgical treatment of OSAS, at various levels of the respiratory tract. [De Britto Teixeira A.O. et al., 2013; Garreau E. et al., 2014; Lekerud A.K. et al., 2012]. It is believed that surgical treatment should be carried out in case of failure of the conservative measures and the identification of anatomical changes at the level of the upper respiratory tract, which most likely lead to their collapse. [Baratieri C. et al., 2011; Chen H., Lowe A.A., 2013; Meslemani D., Jones L.R., 2011]. To identify collapse sites, a number of studies are performed, such as examination, Muller's test, computed tomography of the lateral projection (cephalometry), measurement of the length of the soft palate, anteroposterior pharyngeal size, and others. [Bhamrah G. et al., 2014; Martins O.F. et al., 2018].

According to the modern requirement, surgical interventions for breathing disorders during sleep should take into account different levels of defects of anatomical structures 2012; Leung Y.Y., Lai K.K., 2018. Thus, the range of naval operations includes septoplasty, rhinoplasty, reduction in the size of the turbinates, endoscopic endonasal sinus surgery, removal of Thornwaldt's cyst and others [Abad V.C., Guilleminault C., 2009, Verse T. et al., 2009]. Surgery on the soft palate is in most cases combined with intranasal interventions. [Caprioglio A. et al., 2011; Heidsieck D.S. et al., 2018; Pirelli P. et al., 2012; Villa M.P. et al., 2012].

Treatment of dysfunction of the temporomandibular joint is a laborious process. The most important role is played by the preparation of the patient himself, his mood for recovery. Of great importance in the treatment of dysfunction of the temporomandibular joint is the rehabilitation of the oral cavity, as well as the replacement of prostheses that interfere with the normal functioning of the temporomandibular joint

Currently, a number of conservative methods for correcting disorders of the temporomandibular joint have been proposed. (2015; Greene C.S., Laski D.M., 1988). In clinical practice, selective grinding, acupuncture, therapeutic exercises, autogenic training, and physiotherapy are actively used.

Together with other specialists, patients with dysfunction of the temporomandibular joint are prescribed drug therapy. Most often, such patients are

prescribed sedatives, antidepressants, muscle relaxants, antidepressants. The use of these drugs allows you to remove the feeling of emotional discomfort, fear, as well as reduce the spasm of the masticatory muscles and pain.

Transcutaneous electrical stimulation has proven itself well, as one of the physiotherapeutic methods for treating dysfunction of the temporomandibular joint. The use of this method allows you to stop the pain syndrome and restore the function of the masticatory muscles and the temporomandibular joint. It is noted that the combination of frequencies during dynamic electrical nerve stimulation increases the therapeutic effect, reducing the time of onset of analgesia and lengthening the duration of its action.

A number of studies have demonstrated the high efficiency of magnetic laser therapy in eliminating pain and normalizing the functional state of masticatory muscles. The analgesic effect of laser radiation relieves patients of a feeling of emotional stress, anxiety, which also has a positive effect on the treatment process.

Orthognathic surgery has a beneficial effect on temporomandibular joint dysfunction [Kretschmer W.B. et al., 2019]. Studies have shown the effectiveness of splint therapy in the treatment of pain syndrome with occlusive disorders in the temporomandibular joint in combination with orthopedic and physiotherapeutic methods. [Hu J.L., 2019]. Occlusal splints change the nature of the closing of the teeth, affect the periodontium, masticatory muscles and the temporomandibular joint. In the study of E.R. Ordokova (2018), the use of splint therapy after 10-14 days contributed to a decrease in masticatory muscle tone in 81.8% of the subjects, pain sensitivity in 85.7%. The author notes the presence of a positive result after 1-1.5 months from repositioning splints. According to the author, pain and clicking stopped in 83.3% of the subjects. Carrying out kinesitherapy made it possible to achieve pain relief in all patients after 7 days.

Other researchers also emphasize the positive role of kinesitherapy in the treatment of patients with dysfunction of the temporomandibular joint. Kinesitherapy, according to a number of authors, can significantly reduce pain symptoms within a week.

One of the key principles of successful treatment of patients with dysfunction of the temporomandibular joint, according to a number of authors, is the restructuring of the myotatic reflex. A number of authors note the increased interest of specialists in the surface application of heat to the temporomandibular joint area in the complex treatment of functional disorders of the joint. [Furlan R. et al., 2015].

All patients with pathology of the temporomandibular joint need to balance the muscular balance of the whole body. Scientists believe that the optimization of posture contributes to the myodynamic balance of the muscles of the maxillofacial area and the normalization of occlusion.

Studies by foreign authors indicate the high efficiency of botulinum toxin for the patients with dysfunction of the temporomandibular joint, especially in cases of failure of conservative treatment. [Sipahi Calis A. et al., 2019]. The use of botulinum neuroprotein is the treatment of choice in the presence of bruxism. The question of the choice of muscles, doses of botulinum neuroprotein, and the frequency of injections remain debatable. The evidence base for the safety and efficacy of bruxism treatment with botulinum neuroprotein is also insufficient.

In the studies of foreign authors, the effectiveness of complex treatment of patients with dysfunction of the temporomandibular joint with the use of facial massage, acupuncture and laser therapy was noted. [Pessoa D.R. et al., 2018].

The effectiveness of osteopathic therapy in the complex treatment of patients with dysfunction of the temporomandibular joint is noted. The role of the psycho-emotional state and cognitive-behavioral psychotherapy in a comprehensive treatment plan for patients with dysfunction of the temporomandibular joint is emphasized.

The most effective method in solving the problem of dysfunction of the temporomandibular joint is a combination of dental, orthopedic, and osteopathic treatment. At the same time, the author notes that in some cases, the methods of psychodiagnostics and psychocorrection are of paramount importance. At the same time, the author believes that among the many existing modern methods of psychocorrection, the most optimal in terms of etiopathogenesis is the method of body-oriented psychotherapy.

Correction and restoration of the anatomical shape of the teeth is an important recommendation in the treatment of pathology of the temporomandibular joint, accompanied by dysfunction of the joint. Evaluation of the effectiveness of treatment of patients with dysfunction of the temporomandibular joint should be carried out using virtual-real algorithms for diagnosis and treatment planning using computer technology [Afrashtehfar K.I., Qadeer S., 2014].

The relevance of the study of the effectiveness of the treatment for patients with dysfunction of the temporomandibular joint is extremely high both in terms of the effectiveness of dental practice and in terms of medical and social significance, especially in relation to the able-bodied category of citizens.

Belarusian scientists have developed prognostic criteria for dysfunction: the index of synchrony of muscle pairs of the same name, the index of the prevalence of hypertonicity of the muscles of the maxillofacial area, the index of the intensity of hypertonicity of the same muscle group. These criteria are highly reproducible, have high diagnostic and prognostic information, which helps to evaluate the intermediate and final results of treatment.

The improvement of the deontological tactics of managing patients with dysfunction of the temporomandibular joint remains topical in the treatment process.

Of particular importance at the present stage of development of dental requirements for the quality of dental care by the patient is acquiring such a professionally important quality of specialists as a communicative culture. Psychological aspects of the deontological tactics of managing patients with dysfunction of the temporomandibular joint should be considered the most important component of achieving a positive result in treatment, additional biosocial conditions for ensuring the quality of dental care.

Thus, despite the relevance of the problem of dysfunction of the temporomandibular joint, there are still no common ideas and an algorithm for managing such patients, depending on the individual structural features of the dentoalveolar apparatus.

Conclusion

Timely orthopedic treatment aimed at eliminating occlusal disorders during deformation of the dentition is the prevention of deeper changes in the morphological and functional nature of the dental system. The treatment of patients with dentoalveolar anomalies and adentia is a complex interdisciplinary problem that requires the interaction of doctors of different specialties in order to comprehensively assess the clinical situation, develop an optimal algorithm for diagnosis and treatment, while works devoted to a comprehensive study of this problem are extremely insufficient, which actualizes this study.

In general, as the analysis of literature data shows, that, according to most authors, improving the efficiency of the dental, including orthodontic, service, both in Russia and abroad, should be aimed at solving the following problems: improving the quality of care and improvement of its management system.

Official statistics show a high prevalence of diseases of the teeth and oral cavity in the population of Russian areas, the incidence rates tend to increase, and therefore the need for dental care increases. The wide prevalence of jaw anomalies and defects dictates the need to improve the organization of the treatment of this pathology.

At the same time, it is necessary to introduce advanced management technologies capable of, and the choice of optimal management decisions should be associated with the implementation of innovative medical technologies that meet modern clinical, economic and social criteria.

So, a diverse and complex clinical picture of disorders of the chewing and speech apparatus after a previously unsuccessful orthopedic dental treatment requires: to substantiate and form an optimal diagnostic resource during repeated orthopedic dental treatment; build a rehabilitation system to eliminate morphological changes, aesthetic norms and functional disorders (psyche, occlusion, articulation, periodontal, TMJ, chewing muscles), including - with repeated prosthetics after a previous unsuccessful treatment; develop non-invasive methods of orthopedic treatment (rejection of

abutment crowns, exclusion or minimalism of tooth preparation); give recommendations for practitioners on the prevention of defects in the process of orthopedic dental treatment, aesthetic and functional shortcomings of its results.

The analysis of the literature data indicates that the number of modern publications on respiratory disorders and their relationship with the results of orthognathic surgical treatment is insufficient, which indicates the need for further research. Realizing the importance of this problem, within the framework of this work, it is supposed to evaluate changes in the anatomical structures that ensure the implementation of the function of external respiration, which are observed for the patients with jaw anomalies and diseases of the temporomandibular joint. It seems necessary to assess the extent to which the existing disorders affect the clinical efficacy of surgical treatment in this category of patients. The data obtained will improve the tactics of commanding patients with manifestations of OSAS against the background of anomalies of the DASJ and pathology of the TMJ.

At the same time, in recent years, only a few works have been published that are devoted to systematizing various problems of organizing and improving dental care, in particular, orthodontic care, with a scientific justification for programs to improve the efficiency of the dental service. In this regard, it seems appropriate to create and evaluate the prospects for using information systems to improve the quality of this type of assistance. In this aspect, it is necessary to solve not only medical-organizational, but also methodological, as well as technical problems for the creation and testing in practice of such systems.

CHAPTER 2. MATERIALS AND METHODS OF RESEARCH

2.1. Organization (design) of the study

In 2014-2020 conducted a single-center, open, prospective, non-randomized study, during which a comprehensive examination and treatment of 647 patients with adentia in need of complete reconstruction of the dentition was carried out.

Object of study

The study included 647 patients with a average age of 44.3±15.2 years, including 412 men (63.7%) and 235 women (36.3).

The inclusion criteria for the study were:

- age of patients from 20 to 75 years;
- partial or complete absence of teeth;
- the presence of signs of increased abrasion of teeth;
- deformation of the dentition after previously performed incorrect orthopedic treatment;
- the need for restoration of dentition for functional and aesthetic indications.

Exclusion Criteria:

- the presence of severe somatic pathology or exacerbations of chronic diseases;
- lack of informed consent signed by the patient for inclusion in the study.

Patients were randomized into 3 groups:

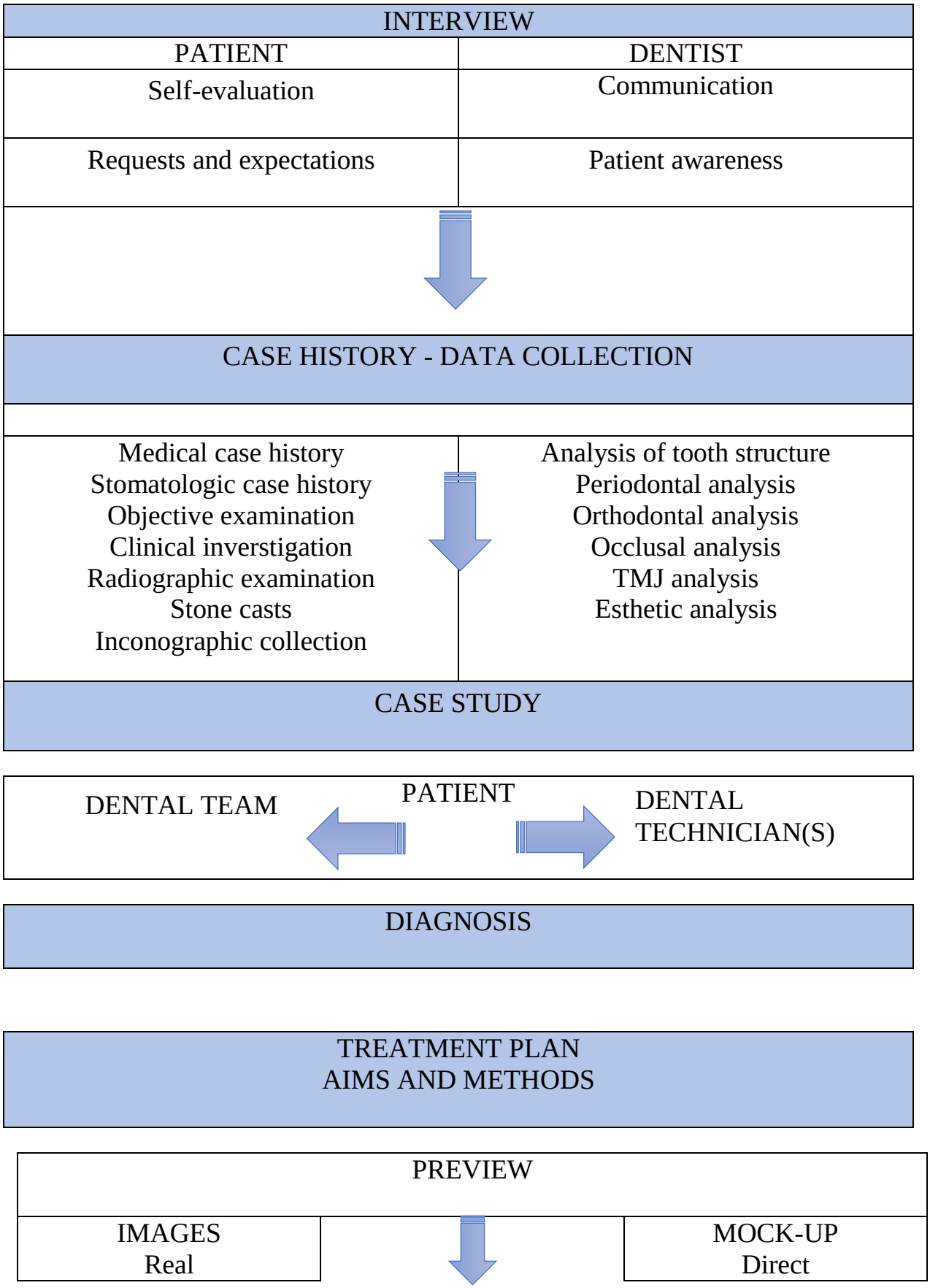
- group 1 (A) - 218 patients treated with standard methods of orthopedic dentistry;
- group 2 (B) - 195 patients, in the treatment of which individual elements of an interdisciplinary approach to dental orthopedic rehabilitation were applied;
- group 3 (C) - 234 patients, in the treatment of which the proposed interdisciplinary approach to dental orthopedic rehabilitation was used.

During the examination of all patients included in the work, a full range of clinical research methods was used, which included:

- clinical functional analysis
- clinical instrumental analysis
- teleroentgenography (TRG) in direct and lateral projections;
- computed tomography of the upper and lower jaw and TMJ;
- assessment of signs of OSAS: polysomnography and assessment of sleep quality;
- electromyography;
- Questioning to study the quality of life and satisfaction of patients with their appearance after the treatment.

The observation of patients included in the study was carried out for 5 years, the studied parameters were evaluated before the start of orthopedic treatment, after 1, 3, 5-7 years.

Figure 2.1 shows the algorithm for the initial examination of an edentulous patient in need of a total reconstruction of the dentition.



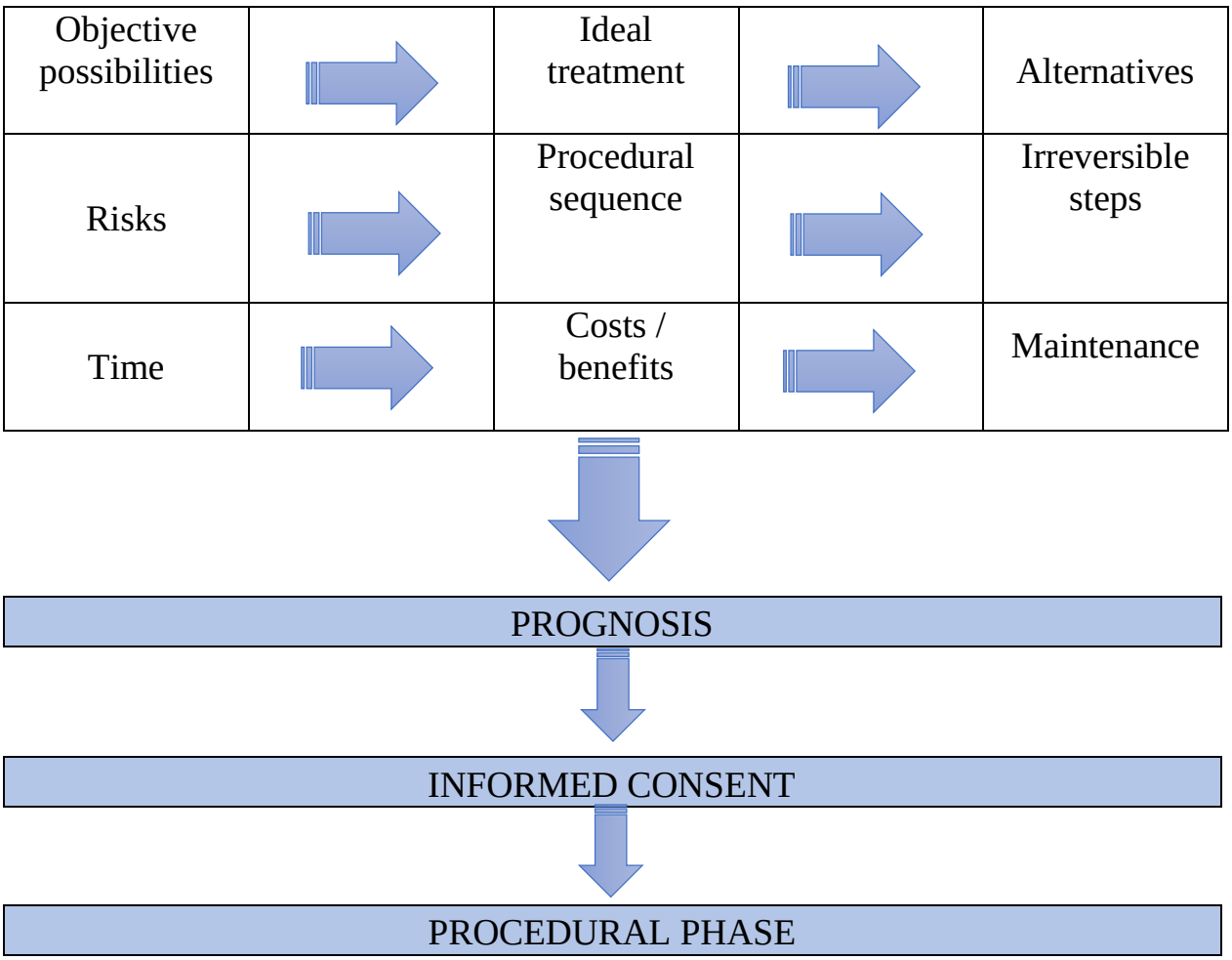


Figure 2.1 Algorithm for preliminary examination of the patient

2.2. Methods of treatment and rehabilitation of patients

In all groups of patients, orthopedic treatment was carried out, while in group 1 (A) a standard set of measures was used, while taking into account the average anatomical characteristics of the patient, while installing fixed all-ceramic crowns without taking into account the individual characteristics of the patient.

Therapeutic and rehabilitation measures in group 2 (B) included the implementation of total restorations, taking into account the results of functional diagnostics and aesthetic indicators.

In group 3 (C), treatment and rehabilitation measures were carried out on the basis of the principles of an interdisciplinary approach developed by us. As part of the implementation of this system, when planning bite correction, the data of an objective examination of patients were taken into account, including the central ratio, therapeutic position, individual hinge-orbital axis, occlusal plane, inclination of the central incisors, bite height. The indicators were evaluated, which were obtained using a complex of diagnostic methods to assess the state of both the dentition and other body systems (respiratory, central nervous, cardiovascular, respiratory, musculoskeletal).

Table 2.1 presents the stages of orthopedic rehabilitation of patients, including the diagnosis and complete reconstruction of the dentition based on the individual anatomical, functional and clinical characteristics of the temporomandibular joint.

Table 2.1 Stages of orthopedic rehabilitation of patients in need of complete reconstruction of the dentition.

№	Stages of rehabilitation	Methods of diagnosis and treatment
1.	Clinical Functional Analysis	Medical history Muscle palpation Brookschecker Occlusion chart Dental history Analysis of models
2.	Clinical instrumental analysis	Condylography Cephalometric analysis Analysis of models in the central relation of the jaws CPM Variator-> MPI (Mandibular position indicator)
3.	Instrumental diagnostics using imaging methods	1) Cone beam computed tomography 2) MRI TMJ 3) Orthopantomogram + CT scan of the upper and lower jaws
4.	Splint therapy	
5.	Plastering models into an articulator	
6.	Repeated control of condylography and cephalometry	
7.	Wax modeling of teeth	
8.	Installation of long-term temporary crowns	
9.	Installation of implants	
10.	Fabrication of definitive restorations	
11.	Monitoring the results of treatment	Condylography and cephalometry

		Analysis of models Brookschecker Occlusion chart Muscle palpation

To ensure the stability of the dentition, the method of selective grinding of hard dental tissues, temporary and permanent splinting, and ceramic restorations in a new therapeutic position were used. Long-term temporary crowns were used.

During the implementation of the proposed approach, when planning treatment, the anatomical and functional characteristics of the dentoalveolar system are studied, with special attention paid to the assessment of the TMJ function.

When studying the anamnesis of patients, the main errors of prosthetics for the patients with the need for total restorations of the dentition are identified and analyzed, and the causes of complications of orthopedic treatment are clarified. Consultations of related specialists (otorhinolaryngologist, neurologist, psychologist, speech therapist, osteopath, cosmetologist) are held.

The results of the aesthetic, clinical, functional and instrumental analysis performed during the diagnostics using the methods of condylography and cephalometry made it possible to determine the central ratio of the jaws when the models were plastered into the articulator. At the same time, an algorithm for working with the Gamma Dental program was used, which allows for occlusion modeling in VTO. An interdisciplinary approach allowed us, when planning an orthopedic, to take into account and timely correct functional and aesthetic disorders associated with malocclusion for the patients undergoing total restoration.

In group 3 (C), the treatment was carried out with the help of non-removable ceramic restorations of the dentition. Modeling and fabrication of structures was carried out using individual Gamma articulators, the advantages of which are casting along an individual hinge axis, measuring the occlusal plane, and assessing gamma rotation. The wax modeling performed in this case with sequential opening allows obtaining high functional and esthetic results of orthopedic rehabilitation of patients in need of total restoration of the dentition.

At the same time, an optimal distribution of loads on the dentoalveolar system is achieved, the risk of chipping of the facing material is reduced, and oral hygiene is also improved.

2.3. Methods of study

2.3.1 Clinical examination

A survey of patients included in the study showed that the main complaints were

aesthetic disproportions of the teeth and face, as well as functional complaints: discomfort when eating and chewing food, articulation disorders, the presence of pain or clicks in the TMJ area. In a number of cases, the place of complaint was grounded for defects of external respiration and respiratory disorders during sleep and the presence of snoring.

According to the results of the survey, a significant part of the patients did not consider such complaints as respiratory disorders, breathing disorders during sleep and the presence of snoring as significant, since they did not see the relationship between functional and aesthetic problems of the maxillofacial area with the above complaints, did not always understand this relationship, not realizing the whole the seriousness of the situation.

At the initial examination, a thorough collection of anamnesis, complaints, examination of the oral cavity and nose was carried out, anthropometric indicators were taken into account, the timing of the manifestation of the disease was identified, and a questionnaire was conducted.

Particular attention for the patients with adentia was paid to the examination of facial structures, the proportions, symmetry of the upper, middle and lower thirds of the face, the relationship of the upper and lower jaws, the anatomy of the face, filtrum, nose, and the presence of a deviated nasal septum were determined.

Inspection of the skin and visible mucous membranes was carried out, while assessing the color, the presence of cicatricial deformities. When examined in the oral cavity, the condition of the mucous membranes, the condition of the tongue, the soft palate, the presence or absence of the tonsils, the condition of the palatine darlings, and the narrowing of the pharyngeal ring were assessed. When concomitant pathology was detected, patients were referred for additional examination and treatment to specialized experts.

During the clinical examination, palpation of all muscle groups of the maxillofacial area, muscles in the head and neck area was performed, as well as an assessment of pain when opening and closing the mouth, when chewing, the presence of a click in the TMJ during jaw movements, pain and spasms in the neck, headaches.

During palpation, the severity of soreness of the muscles of the maxillofacial area was assessed. (m. masseter superficialis, m. masseter deep part, m. pterygoideus medialis, m. pterygoideus lateralis, m. temporalis anterior, m. temporalis medialis, m. temporalis posterior, m. mylohyoideus, m. digastricus, m. suprahyoidale, m. infrahyoidale), postural muscles (m. omohyoideus, m. sternocleidomastoideus), as well as in the neck, shoulders and atlanto-occipital area.

Pain in the joint and on muscle palpation was assessed using a 10-point visual analog scale (VAS).

The study of the state of the TMJ was carried out in order to identify the syndrome

of pain dysfunction of the joint or other diseases of the TMJ due to the presence for the patients for a long time of defects of occlusal relationships and defects in the dentition.

The study of the psychological status was carried out using the occlusal index. Functional analysis also included occlusionograms in the ICP position (intercuspal position), protrusion, left mediotrusion, right mediotrusion and bruxism.

2.3.2 Instrumental research methods

Radiography. X-ray studies were performed using conventional methods at all stages of treatment and as a control after completion of treatment.

Computed tomography (CT) was performed, and the following characteristics were evaluated: the presence of fluid in the joint chambers and changes in the shape of the joint head, signs of arthrosis and arthritis of the TMJ, distal or ventral dislocation of the TMJ disc.

Retrusion stability analysis was performed on the basis of the following characteristics: “protrusion-retrusion”, “right mediotrusion”, “left mediotrusion”.

With the help of a teleroentgenogram (TRG), a cephalometric analysis was performed to diagnose and evaluate the effectiveness of therapeutic and rehabilitation measures carried out for the patients with adentia. Teleroentgenography in the lateral projection makes it possible to make a cephalometric analysis

Condylography was performed for the patients before complex and orthopedic treatment, 1, 3 and 5 years after treatment using the Cadiax Compact condylograph. The analysis of the results obtained using this method was performed by summing up the qualitative and quantitative indicators, the final assessment was carried out according to the total characteristics - "improvement", "deterioration" and "no change" in the corresponding period of the study.

Electromyography. The biopotentials of the masticatory and temporal muscles were recorded using a four-channel electromyograph "Medicor" (Hungary), which allows recording biopotentials from 5 to 500 μV/mm. Registration of frequencies was carried out in the range of 2 - 10000 Hz. Skin bipolar electrodes with a diameter of 7 mm, rigidly fixed on a plastic plate, were used. The distance between the centers of the electrodes always remained constant - equal to 15 mm.

Electromyograms were recorded in the state of: functional rest of masticatory muscles; performing the main function of chewing and swallowing; maximum tension of the masticatory muscles during the closing of the dentition in the central occlusion. Gray bread (mass 1.5 g, volume 1 cm^3) was used as a food stimulant, the same for all subjects.

The intensity of the general electrical activity of the muscle is related to the force of its contraction, and therefore the results of the analysis of data obtained when

performing EMG at the maximum tension of the masticatory muscles in the state of closure of the dentition in central occlusion made it possible to assess the force of contraction of the temporal and masticatory muscles proper, as well as to evaluate it. these muscles on both sides. Taking this into account, we performed a quantitative assessment of electromyograms according to the levels of amplitudes of fluctuations of biopotentials, obtained at the maximum tension of the masticatory muscles.

Polysomnography. During a night's sleep in a hospital or at home, the patient underwent a comprehensive polysomnographic study with registration of an electrocardiogram (ECG), limb movements, snoring, oronasal airflow, respiratory movements of the chest and abdominal wall, saturation of arterial blood with oxygen, and body position. The average duration of monitoring was about 8 hours. The study was carried out on the device "Apnoescreen II +" by Jaeger. ECG was recorded at a standard sensitivity of 1 mV/cm (which is similar to 100 μV/mm), in one lead, with two electrodes oriented along the electrical axis of the heart.

To monitor the air flow of breathing (ventilation), the movement of air during breathing through the nose and/or mouth was assessed - the oronasal flow of breathing.

Pulse oximetry was carried out continuously during the entire monitoring period, which made it possible to continuously monitor arterial oxygen saturation.

During the PSG study, the following were analyzed: the mobility (position) of the body during sleep, the number of awakenings, respiratory changes, the duration of cases of respiratory failure, the severity of desaturation, and the snoring index. An example of a PSG and conclusions on it are shown in Figure 2.2.

Also, with the use of a splint, they looked at improving breathing and reducing snoring. Thus, a new therapeutic position for prosthetics was determined.

2.3.3 Analysis of aesthetic characteristics

The analysis of the aesthetic characteristics of the face was performed in accordance with the algorithms presented in Figures 2.3-2.11 using the following groups of indicators:

1. Characteristics of the face (facial analysis):

- relative number of patients with vertical displacement of the smile line;
- relative number of patients with smile symmetry disorders, taking into account the width of the teeth of the upper jaw (14-24);
- relative number of patients with displacement of the gum contour at the necks of the teeth;

2. Analysis of the ratio of teeth and lips (dentolabial analysis):

- assessment of the position of the central incisors of the upper jaw (interincisial line inclination) and the slope of the interincisal line;

- assessment of the position of the canines of the upper jaw;
- the relative number of patients with impaired pronunciation of sounds F and S;
- dynamics of the assessment of the buccal corridor;
- features of visualization of the central incisors from under the red border of the lips;

3. Dental analysis:

- assessment of the location of the cutting edge of the central incisors relative to the occlusal plane (OP);
- relative number of patients with changes in the size of the upper central incisors;
- relative number of patients with changes in the size of the lower central incisors;
- relative number of patients with defects of interdental approximal contacts;
- relative number of patients with defects of interdental approximal contacts;
- assessment of the inclination of the lower incisors (no inclination, lingual or buccal inclination);
- presence of mulfunctions of the overlap of the teeth (overbite-overjet).

FACIAL ANALYSIS				
FRONTAL VIEW			**LATETAL VIEW**	
HORIZONTAL REFERENCE LINE	Commissural line		PROFILE	E-line
	Interpupillary line			Nasolabial angle
VERTICAL REFERENCE LINE	Midline			Lips
FACIAL PROPORTIONS	Facial thirds			

FACIAL ANALYSIS				
FRONTAL VIEW			**LATETAL VIEW**	
HORIZONTAL REFERENCE LINE	¤ Re-establish between the occlusal plane and the interpupillary and commissurat lines		E-LINE NASOLABIAL ANGLE	¤ Modify dental arrangement - without interfering with the active muscular area
VERTICAL	¤ Disregard the		CONCAVE	¤ Re-

REFERENCE LINE	asymmetry with the facial midline ¤ Re-establish a dominance of the anterior teeth e-establish verticality of the interincisal line		PROFILE THICK LIPS	establish a marked dominance of the anterior teeth
FACIAL PROPORTIONS	¤ Re-establish a correct vertical dimension to re-create an adequate height of the lower third of the face		CONCAVE PROFILE THICK LIPS	¤ Re-establish a moderate dominance of the anterior teeth

Figure 2.3 Facial analysis

DENTOLABIAL ANALYSIS
TOOTH EXPOSURE REST
INCISAL EDGE
SMILE LINE
SMILE WIDTH
LABIAL CORRIDOR
INTERINCISAL LINE vs FACIAL MIDLINE
OCCLUSAL PLANE vs COMMISSURAL LINE

DENTOLABIAL ANALYSIS	
TOOTH EXPOSURE REST	¤ Re-establish tooth exposure to between 1 and 5 mm according to age and sex
INCISAL EDGE	¤ Incisal curvature ¤ Commissural line parallel to the lower lip ¤ Interpupillary line ¤ Keep the incisal proter inside the vermillion border of the lower lip
SMILE LINE	¤ Gingival contour correction (orthodontic SMILE LINE surgery) ¤ Biological integration ¤ Avoid gingival idealization ¤ Give preference to the supragingival margin of crowns
SMILE WIDTH	¤ Estimate the number of visible teeth ¤ Choose material for aesthetics and function

LABIAL CORRIDOR	¤ Re-established correct inclination of the posterior teeth ¤ Idealize the smile progression
INTERINCISAL LINE vs FACIAL MIDLINE	¤ Re-established the verticaly of the interincisal line ¤ Citregard any discreancy with the facial midline
OCCLUSAL PLANE vs COMMISSURAL LINE	¤ Re-established paratilism between the occlusal plane and th interpapullary commissural and horizon lines

Figure 2.4 Dentolabial analysis

PHONETIC ANALYSIS	
PRONUNCATION OF THE M SOUND	¤ Evaluate incisal lenght ¤ Evalute vertical dimention
PRONUNCATION OF THE E SOUND	¤ Evaluate incisal lenght
PRONUNCATION OF THE S AND V SOUNDS	¤ Evaluate incisal lenght ¤ Evaluate incisal profile
PRONUNCATION OF THE S SOUND	¤ Evaluate tooth proportion ¤ Evaluate vertical dimention

M SOUND	
Prosthetic considirations for esthetic rehabillitation	
INCISAL LENGHT	Correct if on the basis of sex and age, tooth exposure in the interval between one pronunciation and the next is between 1 and 5 mm.
VERTICAL LENGHT	Correct if in the interval between one pronunciation and the next, the interarch space is between 2 and 4 mm.

E SOUND	
Prosthetic considirations for esthetic rehabillitation	
INCISAL LENGHT	
YOUNG PATIENTS	The maxillary teeth can occupy up to 80% of the space between the lips.
ELDERLY PATIENTS	The teeth should occupy no more than 50% of the space between the lips.

Figure 2.5 Phonetic analysis

TOOTH ANALYSIS: MAXILLARY TEETH
TYPE, COLOR, TEXTURE
FORM AND CONTOUR
SIZE AND PROPORTION
INCISAL MARGIN AND BUCCAL PROFILE

TOOTH ANALYSIS: MAXILLARY TEETH	
TYPE	¤ Identify the tooth type on the basis of: ¤ Adjacent teeth ¤ Old photos and/or stone models ¤ Gingival architecture
COLOR	¤ Choose the tooth color on the basic of: adjacent teeth, age, patient requests. ¤ Reproduced the chromatic progression from central incisor to canine ¤ Illusory perception: Vary hue, chroma, value, traslucency/opacity, and surface characterizations to create the illusion of modified dimention
TEXTURE	¤ Give the restoration macro-andmicrotexture onthe basic of: ¤ Adjacent teeth ¤ Age of patient
FORM AND CONTOUR	¤ Restore the shape and contour based on the morphological characteristics of each individual tooth. ¤ Illusory perception: Vary transition line angles, contour, and horizontal and vertical ridges and line to create an illusion of modified size
DIMENTION	¤ Reproduce dimensions similar to those found Central incisors: Width: from 8.3 to 9.3 mm Length: from10.4 to 11.2 mm
PROPORTION	¤ Restore natural proportions, especially in the central incisors ¤ Width-length = 75% to 80%
INCISAL MARGIN	¤ Re-established correct buccolingual tilt of the incisal ¤ Inner border of the restoration in a more apical position
INCISAL PROFILE	¤ Re-create a correct incisal profile ¤ Maxillary incisal profile should be within the vermillion border of the lower lip

Figure 2.6 Analysis of the aesthetic characteristics of the teeth

TOOTH COMPOSITION: MAXILLARY TEETH
TOOTH-TO-TOOTH PROPORTION
INTERDENTAL CONTACT AREAS AND INTERINCISAL ANGLES
AXIAL INCLINATION
TOOTH POSITION AND ARRANGEMENT

TOOTH COMPOSITION: MAXILLARY TEETH	
TOOTH-TO-TOOTH PROPORTION	¤ Evaluate edaquate dominance of the central incisors ¤ Re-establish corrector proportion in the central incisors (with-lenght = 75% to 80%) ¤ Shorten and/or narrow the lateral incisors to accentuate the dominance of the central incisors (illusory perception)
INTERDENTAL CONTACT AREAS AND INTERINCISAL ANGLES	¤ Re-establish progressively more apical contact areas from the central incisor to the canine ¤ Re-create progressively wider interincisal angles from the central incisor to the canine
AXIAL INCLINATION	¤ Re-establish symmetry ans axial mirror imaging in relation to the midline between right and left ¤ Restore apical distoinclination, which should be progressively more accentuated from the central incisors to the canine
TOOTH POSITION AND ARRANGEMENT	¤ Position the lateral incisors so that they lie within the two lines that join the cervical and incisal areas of the central incisors and canines ¤ Vary the dimentions, position and axial inclination to create an illusion of having modified the reduced or excessive space (illusory perception)

Figure 2.7 Analysis of the aesthetic characteristics of the teeth of the upper jaw

TOOTH ANALYSIS: MANDIBULAR TEETH
CONTOUR AND PROPORTION
ARRANGEMENT
INCISAL EDGE

TOOTH ANALYSIS: MANDIBULAR TEETH	
CONTOUR AND PROPORTION	¤ Re-establish distal profile of the lateral incisor, ie, make it more convex than central incisors ¤ Restore width of the lateral incisor, ie, approximately 10% greater than central incisor
ARRANGEMENT	¤ Re-establish aligment of the four

	incisors without sacrificing shape and countour ¤ Make slight rotation and overlaps to give tooth composition a dynamic and natural appearance
INCISAL EDGE	¤ Re-establish incisal edge inclined in ateropodterior direction ¤ Re-establish lingual out line higher than buccal outline

Figure 2.8 Analysis of the aesthetic characteristics of the teeth of the lower jaw

ANTERIOR TEETH: FUNCTIONAL ASPECTS	
MAXIMAL INTERCUSPAL POSITION	¤ First choice of occlusion with limited number of restorations
CENTRIC RELATION AND CENTRIC OCCLUSION	¤ Procedural choice in more extensive cases of prosthetic rehabilitation
INCISAL GUIDANCE	¤ Procedural choice in more extensive cases of prosthetic rehabilitation
CANINE GUIDANCE	
OVERJET	¤ Excessive overjet: Re-create contact between maxillary and mandibular teeth for correct anterior guidance ¤ Reduced overjet: Orthodontic treatment is recommended to increase level of overjet and to prevent fracture of restorations
OVERBITE	¤ Deep overbite: Reduce depth to avoid guidance that is too steep and difficult during excursive movement ¤ Reduced overbite: Increase level to avoid possible interference with posterior teeth during excursive movement

INCISAL EDGE POSITION	
DENTOLABIAL ANALYSIS	¤ Exposure of maxillary teeth ¤ Re-establish exposure of with rest from 1 to 5 mm, depending on age and sex ¤ Incisal curvature ¤ Re-establish an incisal an curvature that is parallel with the lower lip
PHONETIC ANALYSIS	¤ S sound ¤ F and V sounds ¤ Limit the modification to the tooth position in the buccllingual direction in the case of horizontal mandibular

	movement ¤ Position the incisal profile inside the vermillion border of the lower lip
TOOTH ANALYSIS	¤ Overjet/overbite ¤ Restore an andecuate amount of overjet/overbite to allow disclusion of the posterior teeth through correct canine guidance

Figure 2.9 Analysis of the aesthetic characteristics of the anterior teeth

TOOTH LENGHT	
INCISAL EDGE POSITION	¤ Idealize incisal edge position, evaluating dentolabiai, phonetic (s and f/v), and functional parameters
PHONETIC TESTS	¤ Evaluate tooth exposure during pronunciation of phonemes ¤ M: With lips at rest, exposure from 1 to 5 mm ¤ E: 80% of interlabial space should show in young subjects. less than 50% of interlabial space is elderly subjects ¤ F/V: incisal edge just brushing lower lip
TOOTH DIMENTION AND PROPORTION	¤ Optimize dimensions and proportions ¤ Maxillary central incisor: from 8.1 to 9.3 mm, lenght from 10.4 to 11.2 mm ¤ Width-length proportion should equal 75% to 80%
LENGHT OF ADJACENT TEETH	¤ Modily tooth length while maintaining harmony with adjacent teeth
SMILE LINE/DINGIVAL LEVELS	¤ Evaluate tooth display during smile and respect tooth dimensions and proportions while making any adjustments to cervical length

OUTLINE OF GINGIVAL MARGINS
PARALLEILISM
SYMMETRY
ZENITH
PAPILLAE

Figure 2.10 Evaluation of tooth length and gingival margin contours

POSTOPERATIVE TISSUE STABILITY
SMILE LINE
GINGIVAL
INCISAL CURVE

TOOTH LENGHT
TOOTH ARRANGEMENT

POSTOPERATIVE TISSUE STABILITY
GINGIVECTOMY WITH INTERNAL BEVEL → 6 WEEKS*
BUCCAL RESECTIVE SURGERY → > 3 MOUNTHS*
RESECTIVE SURGERY → > 6 MOUNTHS*
* Monitor the patient and take into account individual variability

GINGIVAL MARGIN OUTLINE
MAINTAIN OR RE-ESTABLISH PARALLELISN BETWEEN GINGIVAL MARGINS, INCISAL EDGE AND LOWER LIP
OPTIMIZE SYMMETRY BETWEEN RIGHT AND LEFT SIDES
"DRAW" THE GINGIVAL ZENITHS IN A DISTAL POSITION TO THE TOOTH AXIS
PRESERVE OR "RE-CREATE" INTERDENTAL PAPILLAE

Figure 2.11 Analysis of parallelism and symmetry, gingival margin contour and tissue stability

2.3.4 Questionnaire research methods

Sleep quality was assessed by the method of scoring the subjective characteristics of sleep, which includes 6 indicators of sleep quality, assessed on a 5-point scale [Rasskazova E.I., Tkhostov A.Sh., 2012]. A value of 22 points or more represents indicators characteristic of healthy subjects without sleep disturbances (normal sleep), 19-21 points are borderline values, less than 19 points are pathological conditions (sleep is disturbed).

Assessment of the quality of life. In recent years, the assessment of the level of quality of life (QoL) of patients has been used in various fields of medicine to assess the effectiveness of treatment methods and various rehabilitation technologies, predict the disease and the effectiveness of treatment [Jung M.H., 2014]. QOL is an additional criterion for the selection of individual therapy and examination of working capacity, analysis of the ratio of costs and effectiveness of medical care, as well as for identifying psychological problems and monitoring them in the system of general practice, individualization of treatment [Khudiakova L.I., 2012].

The QoL of patients was assessed using a specialized dental questionnaire OHIP-14 (Table 2.2), which was developed by Slade G.D. (1994), the Russian version was validated and used in the studies of Barer G.M. (2007). This is a negative questionnaire, the questions of which are divided into three domains - problems with eating, problems

with communication, problems in everyday life.

Table 2.2 OHIP-14 Quality of Life Questionnaire

	Question	Very often	Rarely	Usually	Almost never	Never
Problems with eating.	1. Have you lost your taste for food due to problems with your teeth, tunica mucosa of mouth or dentures?					
	2. Do you experience pain in your mouth?					
	3. Do you have difficulty eating because of problems with your teeth, tunica mucosa of mouth or dentures?					
	4. Do you eat unsatisfactorily because of problems with your teeth, tunica mucosa of mouth or dentures?					
	5. Do you have to interrupt meals because of problems with your teeth, tunica mucosa of mouth or dentures?					
Communication problems.	6. Do you feel uncomfortable because of problems with your teeth, oral mucosa or dentures?					
	7. Do you have difficulty pronouncing words due to problems with					

	your teeth, oral mucosa or dentures?					
	8. Do you feel constrained in communicating with people because of problems with teeth, oral mucosa or dentures?					
	9. Do problems with your teeth, oral mucosa or dentures put you in an awkward position?					
	10. Do problems with teeth, oral mucosa or dentures lead you to increased irritability when communicating with people?					
	11. Do you have difficulties in normal work due to problems with your teeth, oral mucosa or dentures?					
Problems in everyday life (work and leisure).	12. Do problems with teeth, oral mucosa or dentures prevent you from resting, relaxing?					
	13. Does your life become less interesting because of problems with teeth, oral mucosa or dentures?					
	14. Do you have to completely "drop out of life" because of					

	problems with teeth, oral mucosa or dentures?					

The participation of the patient in filling out the questionnaire allows you to obtain valuable information, which differs in a number of parameters from the conclusions made by the doctor, and allows you to find out the complex attitude of the patient to his disease [Kuznetsova E.V. et al., 2011].

Evaluation of patient satisfaction with the results of treatment. The treatment outcome was assessed based on the results of a survey of patients using the Global Aesthetic Improvement Scale (GAIS) questionnaire on the appropriate score scale (Table 2.3).

Table 2.3 Global Aesthetic Improvement Scale

Number of points

Number of points	Patient evaluation
3	Completely satisfied with the result
2	Satisfied with the result, but I would like to improve a little
1	Slight improvement, additional correction is desirable
0	Without changes
-1	Condition worse than before treatment

2.4 Statistical processing of the obtained data

Analysis of the study results was performed using Statsoft software packages. STATISTICA 10 and Microsoft Excel 2016. The choice of the main characteristics and statistical criteria when comparing them was carried out after studying the distribution of the feature and comparing it with the Gauss distribution according to the Kolmogorov-Smirnov criterion. Due to the fact that the total sample size exceeded 200 subjects, and in each group the number of patients exceeded 100 people, intergroup comparisons in quantitative indicators were carried out using Student's t-test in unrelated samples.

Qualitative parameters were presented as the frequency of occurrence of signs as a percentage of the total number of patients in the respective groups. The chi-square test was used to analyze differences in qualitative parameters. Differences were considered statistically significant if the "p" threshold value of the level of statistical significance of the null hypothesis (alpha) was not reached, equal to 0.05

CHAPTER 3. DYNAMICS OF CLINICAL CHARACTERISTICS OF PATIENTS

3.1 Results of palpation of the muscles of the maxillofacial area after treatment carried out

Analysis of the severity of pain on palpation m. masseter superficialis showed that after treatment, improvement in group 1 was observed in less than half of the patients - in 92 (42.3%) cases, in group 2 - statistically significantly more often ($p<0.05$) in 187 patients (95.9%), in group 3 also significantly more often - in 230 patients (98.3%) (Figure 3.1). No changes were noted in group 1 - in 86 (29.5%) patients, in group 2 - in 7 patients (3.6%), in group 3 - in 4 patients (1.7%), deterioration was observed in the group 1 - in 40 (18.3%) patients, in group 2 - in 1 patient (0.5%), in group 3 - none. Thus, the treatment contributed to a significant reduction in pain in the area of the studied muscle group after its completion.

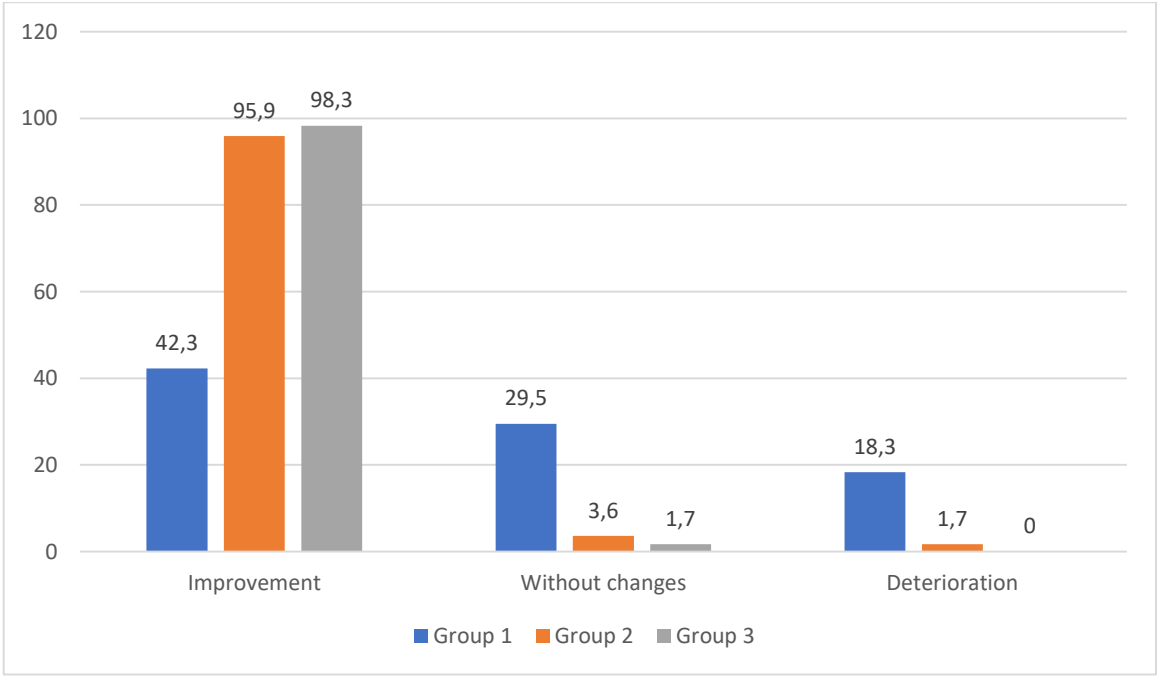


Figure 3.1 Manifestations of pain on palpation m. masseter superficialis after treatment

Further observation showed that the identified ratios of manifestations of pain m. masseter superficialis in patient groups persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of patient examination (Table 3.1).

Table 3.1 The dynamics of pain on palpation m. masseter superficialis

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	90	41,3	184	94,4*	228	97,4*
Without changes	73	33,5	6	3,1*	4	1,7*
Deterioration	55	25,2	5	2,5*	2	0,9*
Three years after						
Improvement	40	18,3	180	92,3*	228	97,4*
Without changes	151	69,3	11	5,6*	1	0,5*
Deterioration	27	12,4	4	2,1*	5	2,1*
Five years after						
Improvement	51	23,4	179	91,8*	226	96,6*
Without changes	148	67,9	9	4,6*	5	2,1*
Deterioration	19	8,7	7	3,6	3	1,3

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the $\chi 2$ criterion

After 7 years, improvement was observed in group 1 - in 52 (23.8%) patients, in group 2 - statistically significantly more often ($p<0.05$) - in 180 patients (92.3%), in group 3 - also significantly more often - in 228 patients (97.4%) (Figure 3.2). No changes were observed in Group 1 in 143 (65.6%) patients, in Groups 2 and 3 significantly less frequently ($p<0.05$) - in 13 patients (6.7%) and 4 patients (1.7%), respectively. Deterioration was observed in group 1 - in 23 (10.6%) patients, in group 2 - in 2 patients (1.0%), in group 3 - in 2 patients (0.9%).

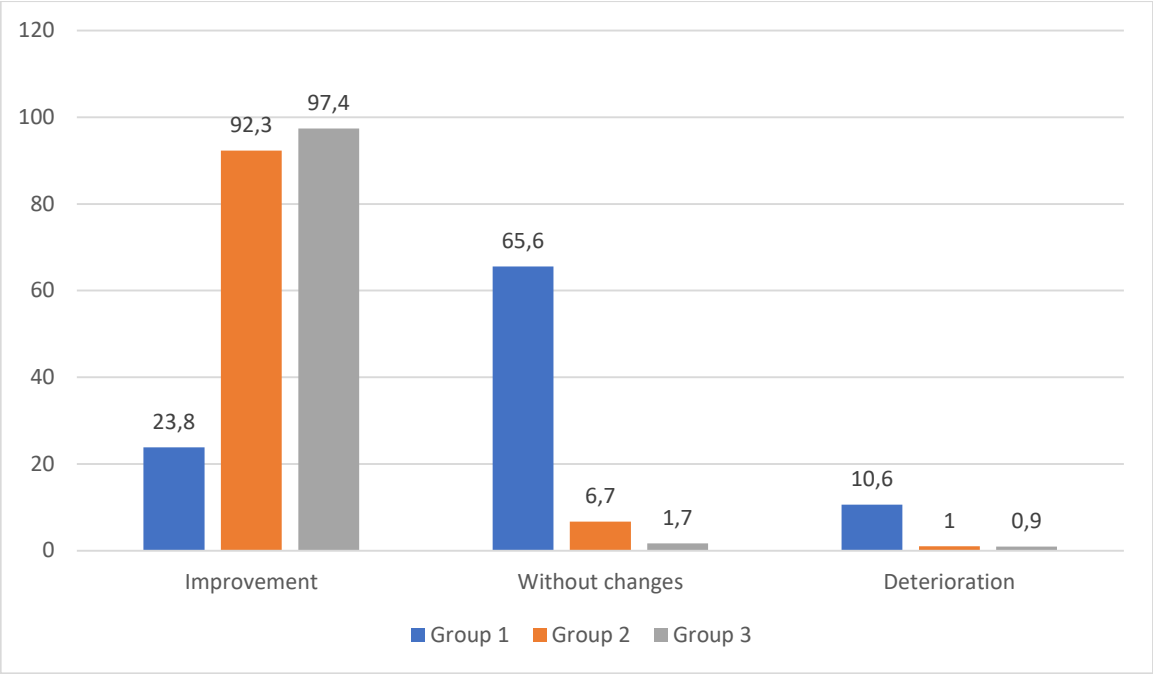


Figure 3.2 Manifestations of pain on palpation m. masseter superficialis after 7 years

The study of the dynamics of pain on palpation m. masseter deep part showed that after treatment, improvement in group 1 was noted in 87 (39.9%) patients, in group 2 - statistically significantly more often ($p<0.05$) - in 182 patients (93.3%), in group 3 - also statistically significantly more often - in 226 patients (96.6%) (Figure 3.3).

Absence of changes were found in group 1 - in 79 (36.2%) patients, in Groups 2 and 3 it was statistically significantly less common ($p<0.05$), 6 such cases were noted (3.1% and 2.6%, respectively).

Deterioration was observed in group 1 - in 52 (23.9%) patients, in group 2 significantly less frequently ($p<0.05$) - in 7 patients (3.6%), in group 3 - in 2 cases (0.8 %).

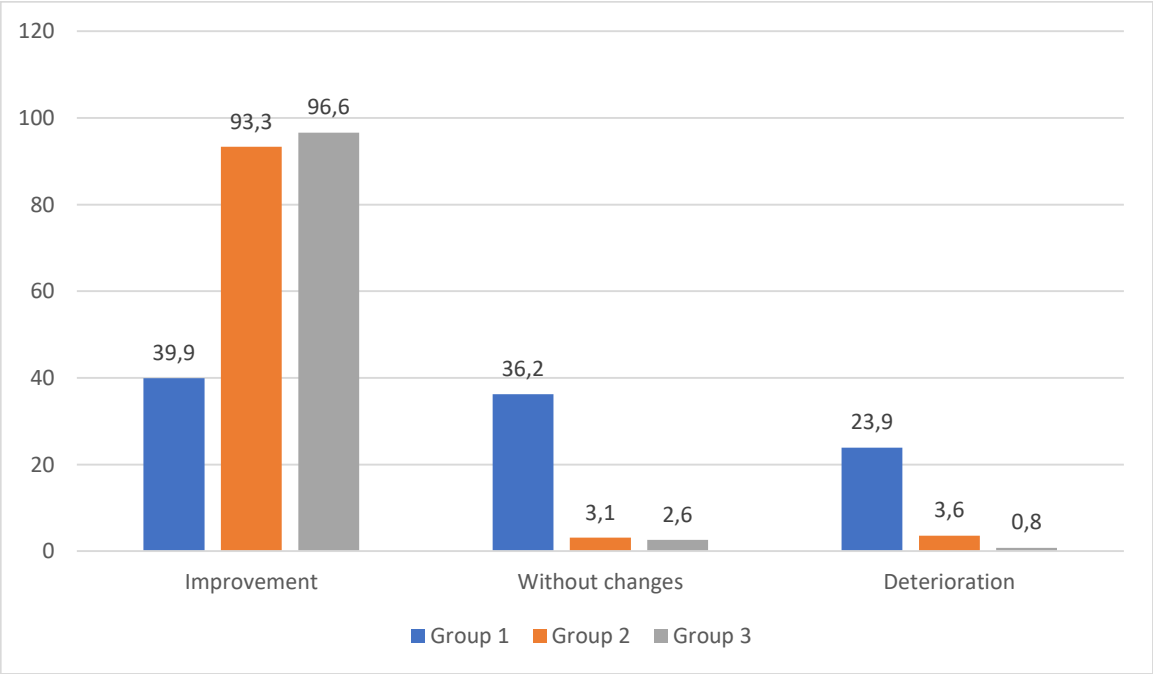


Figure 3.3 Manifestations of pain on palpation m. masseter deep part after treatment

Further observation showed that the identified ratios of manifestations of pain m. masseter deep part in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.2, figure 3.4).

Table 3.2 The dynamics of pain on palpation m. masseter deep part

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	91	41,7	180	92,3*	220	94,0*
Without changes	70	32,2	11	5,6*	9	3,9*
Deterioration	57	26,1	4	2,1*	5	2,1*
Three years after						
Improvement	40	18,3	177	90,8*	224	95,8*
Without changes	148	67,9	12	36,1*	5	2,1*
Deterioration	30	13,8	6	3,1*	5	2,1*
Five years after						
Improvement	44	20,2	178	91,3*	219	93,6*
Without changes	149	68,3	10	5,1*	8	3,4*
Deterioration	25	11,5	7	3,6*	7	3,0*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

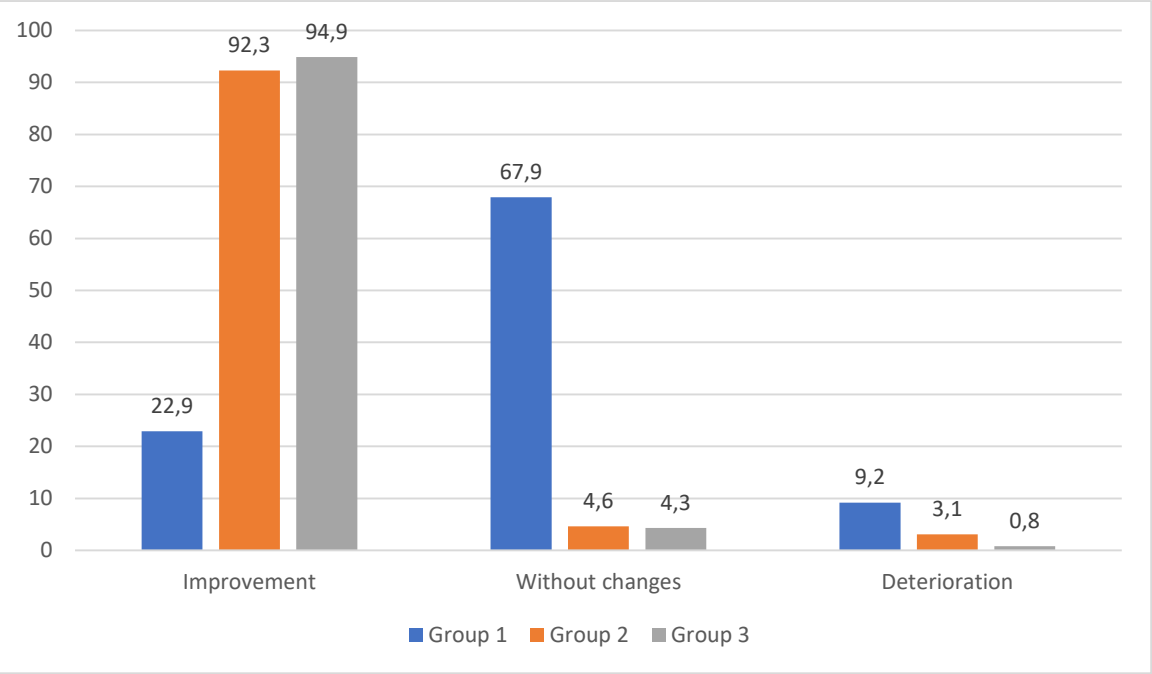

100
90
80
70
60
50
40
30
20
10
0
22,9
92,3
94,9
67,9
4,6
4,3
9,2
3,1
0,8
Improvement
Without changes
Deterioration
Group 1
Group 2
Group 3

Figure 3.4 Manifestations of pain on palpation m. masseter deep part 7 years after treatment

Assessment of the presence of pain on palpation m. pterygoideus medialis showed that after treatment Improvement was observed in group 1 in 39 (17.9%) patients, while in Groups 2 and 3 the values of these indicators were significantly higher ($p<0.05$) - their levels were 150, respectively (76.9%) and 180 patients (76.9%) (Figure 3.5). There were no changes in the manifestation of pain in 126 (57.8%) patients of the first group, while in the second and third Groups the level of this indicator was statistically significantly lower: group 2 - in 40 patients (20.5%), in group 3 - in 43 patients (18.4%). Deterioration was noted in group 1 - in 53 (24.3%) patients, in group 2 - in 5 patients (2.6%), and in group 3 - in 11 patients (4.7%), the values of the indicators in the last two Groups were statistically significantly ($p<0.05$) lower than in group 1.

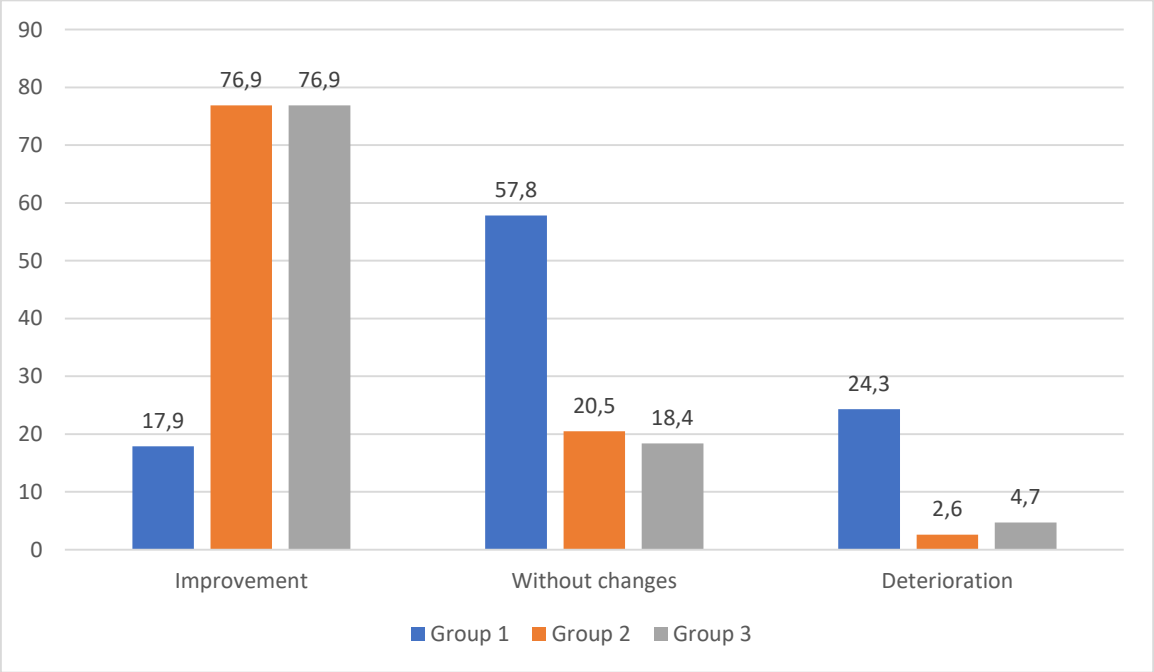


Figure 3.5 Manifestations of pain on palpation m. pterygoideus medialis after treatment

Further observation showed that the identified ratios of manifestations of pain m. pterygoideus medialis in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.3, figure 3.6).

Table 3.3 The dynamics of pain on palpation m. pterygoideus medialis

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	39	17,9	149	76,4*	178	76,1*
Without changes	137	62,8	36	18,5*	43	18,4*
Deterioration	42	19,3	10	5,1*	13	5,5*
Three years after						
Improvement	44	20,2	150	76,9*	174	74,4*
Without changes	124	56,9	31	15,9*	42	17,9*
Deterioration	50	22,9	14	7,2*	18	7,7*
Five years after						
Improvement	43	19,7	148	75,9*	170	72,6*
Without changes	115	52,8	37	19,0*	44	18,8*
Deterioration	60	27,5	10	5,1*	20	8,6*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

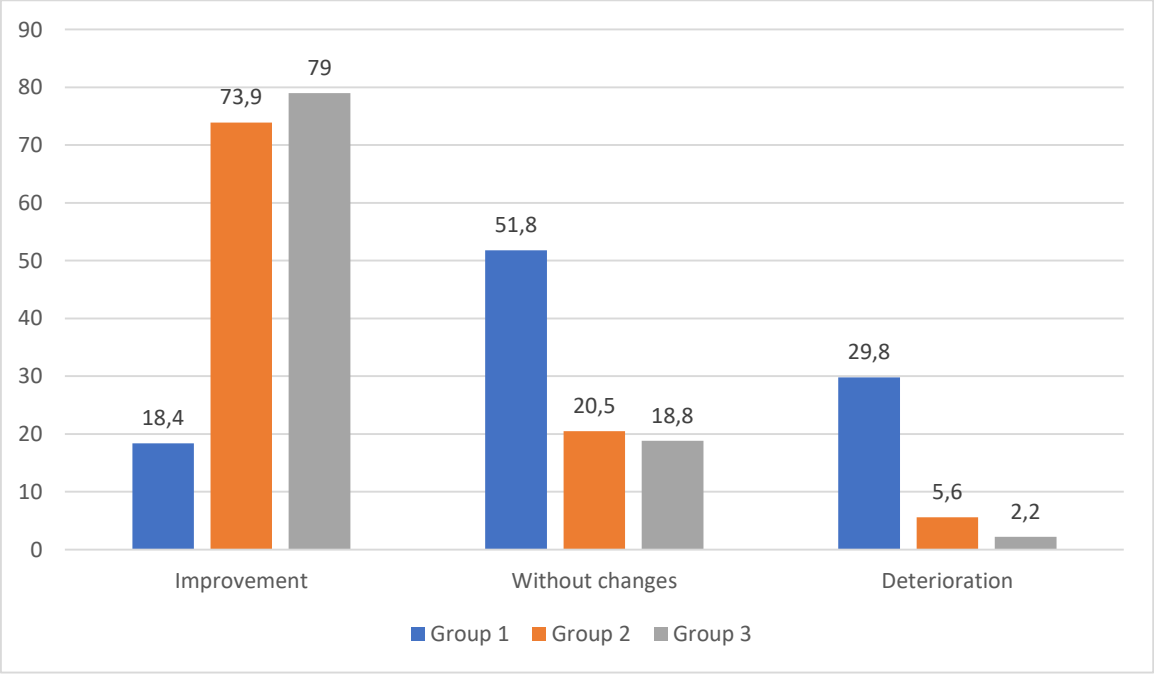


Figure 3.6 Manifestations of pain on palpation m. pterygoideus medialis after 7 years of observation

The dynamics of pain on palpation m. pterygoideus lateralis also significantly decreased according to the results of the survey, while this change was most expressed in the Groups of patients in the treatment of which the multidisciplinary approach we proposed was used. So, after treatment, Improvement in group 1 was observed only in 25 (11.5%) patients, while in Groups 2 and 3 it was statistically significantly more common ($p<0.05$): respectively, in 148 (75.9%) and 182 patients (77.8%) (Figure 3.7).

There were no changes in pain during palpation of this muscle in 150 (68.8%) patients of the first group, in the second - much less often - in 42 cases (21.5%), as in group 3 - in 46 patients (19 .7%). Deterioration was observed in group 1 - in 43 (19.7%) patients, in group 2 - in 5 patients (2.6%), in group 3 - in 6 patients (2.5%). At the same time, in all cases, the values of the indicators in Groups 2 and 3 were significantly lower ($p<0.05$) relative to those in the first group, that is, For the patients who underwent standard measures of dental orthopedic rehabilitation.

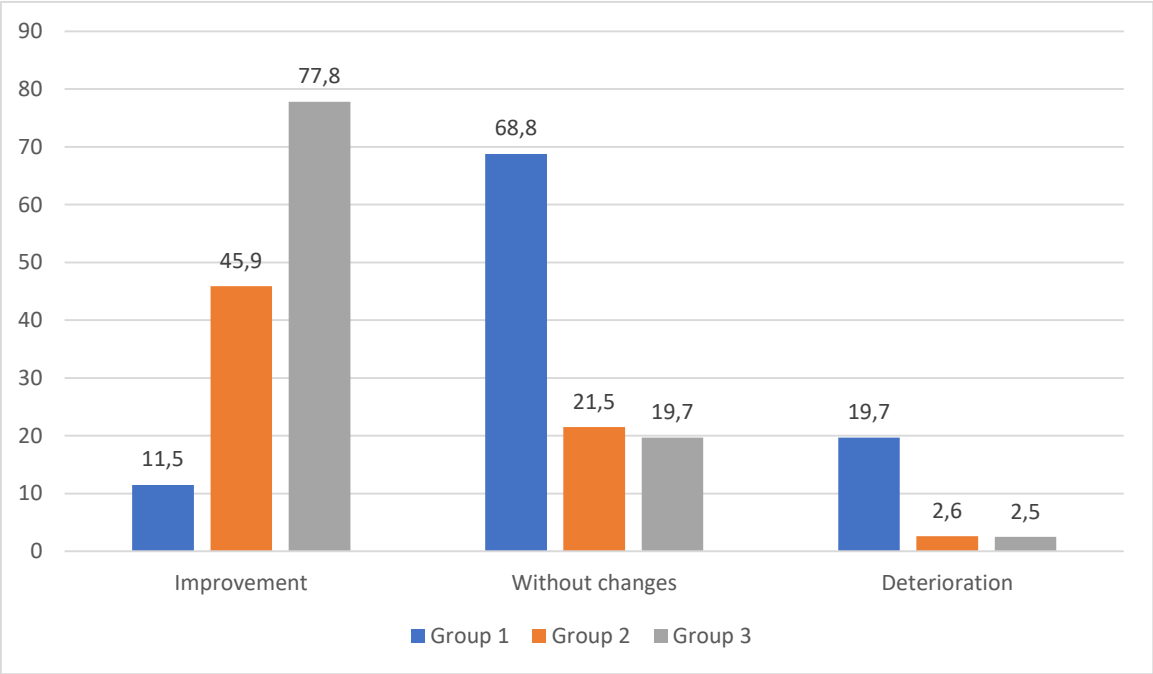


Figure 3.7 Manifestations of pain on palpation m. pterygoideus lateralis after treatment

Further observation showed that the identified ratios of manifestations of pain m. pterygoideus lateralis in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.4, figure 3.8).

Table 3.4 The dynamics of pain on palpation m. pterygoideus lateralis

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	30	13,8	151	77,4*	176	75,2*
Without changes	148	67,9	38	19,5*	48	20,5*
Deterioration	40	18,3	6	3,1*	10	4,3*
Three years after						
Improvement	26	11,9	150	76,9*	180	76,9*
Without changes	154	70,7	32	16,4*	39	16,7*
Deterioration	38	17,4	13	6,7	15	6,4
Five years after						
Improvement	39	17,9	147	75,4*	176	75,2*
Without changes	121	55,5	30	15,4*	43	18,4*
Deterioration	58	26,6	18	9,2*	15	6,4*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

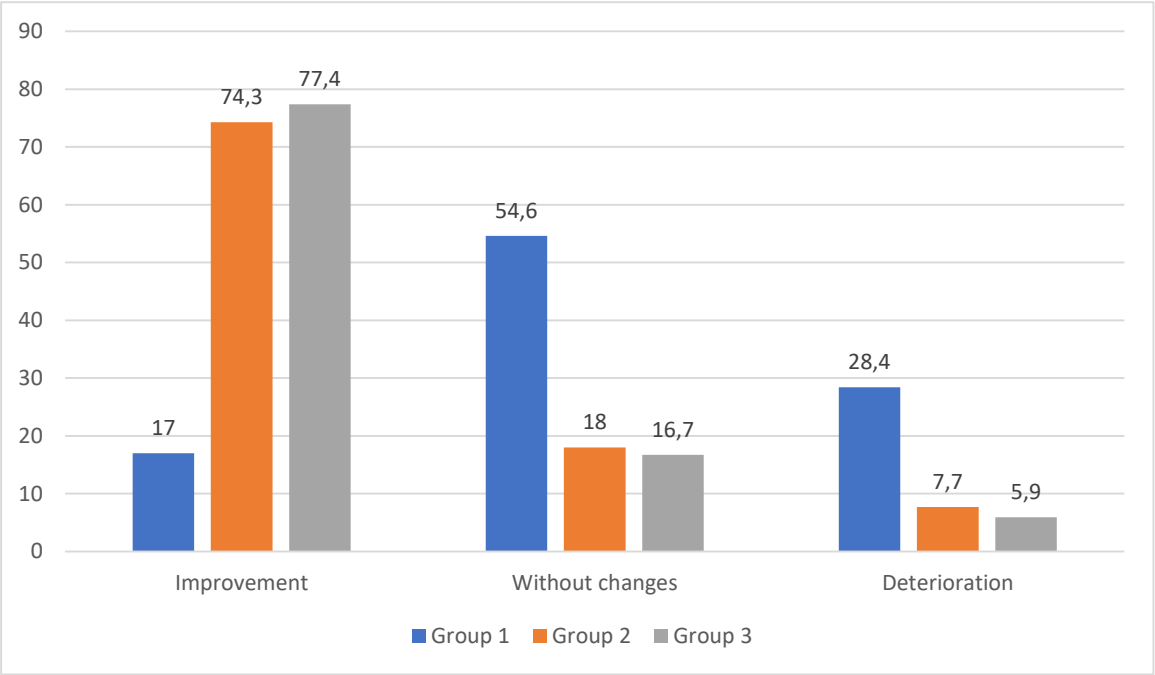


Figure 3.8 Manifestations of pain on palpation m. pterygoideus lateralis 7 years after treatment

Analysis of the manifestations of pain on palpation m. temporalis anterior showed that Improvement was noted after treatment in 120 (55.0%) patients of group 1, while in Groups 2 and 3 the number of such cases was statistically significantly higher ($p<0.05$): 170 (87.2%) in group 2, and 230 (98.3%) in group 3 (Figure 3.9). There were no changes in 75 (34.4%) patients of group 1, and in group 2 - the level of this indicator was more than 3 times lower - 20 (10.2%) cases. It should be noted that in group 3, pain in this area was observed only in 4 patients (1.7%), the value of the indicator was statistically significantly lower ($p<0.05$) than in Groups 1 and 2. Deterioration was observed in group 1 - in 23 (10.6%) patients, in group 2 - in 5 patients (2.6%), in group 3 there were no cases of deterioration in relation to this symptom.

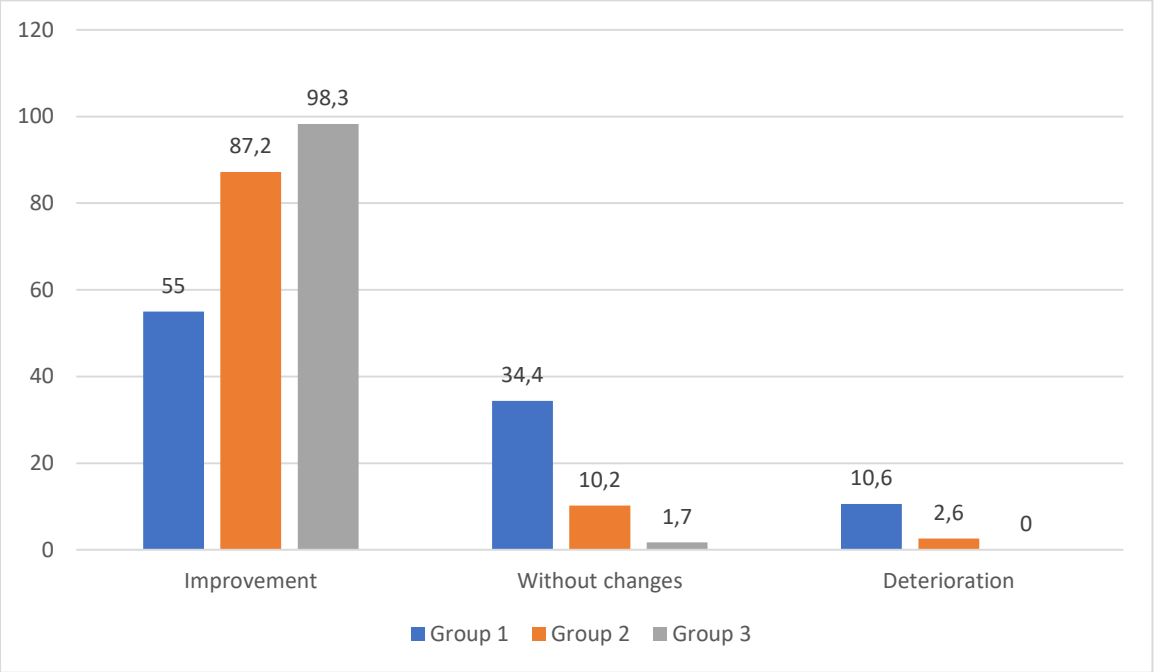


Figure 3.9 Manifestations of pain on palpation m. temporalis anterior after treatment

Further observation showed that the identified ratios of manifestations of pain m. temporalis anterior in Groups of patients persisted after 1, 3 and 5 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.5, figure 3.10).

Table 3.5 The dynamics of pain on palpation m. temporalis anterior

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	120	55,0	172	88,2*	230	98,3*

Without changes	75	34,4	18	9,2*	3	1,3*#
Deterioration	23	10,6	5	2,6*	1	0,4*
Three years after						
Improvement	110	50,5	163	83,6*	225	96,2*
Without changes	82	38,1	19	9,7*	9	3,8*
Deterioration	25	11,4	13	6,7	-	-
Five years after						
Improvement	110	50,5	163	83,6*	227	97,0*
Without changes	83	36,7	21	10,8*	7	3,0*
Deterioration	28	12,8	11	5,6	0	-

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

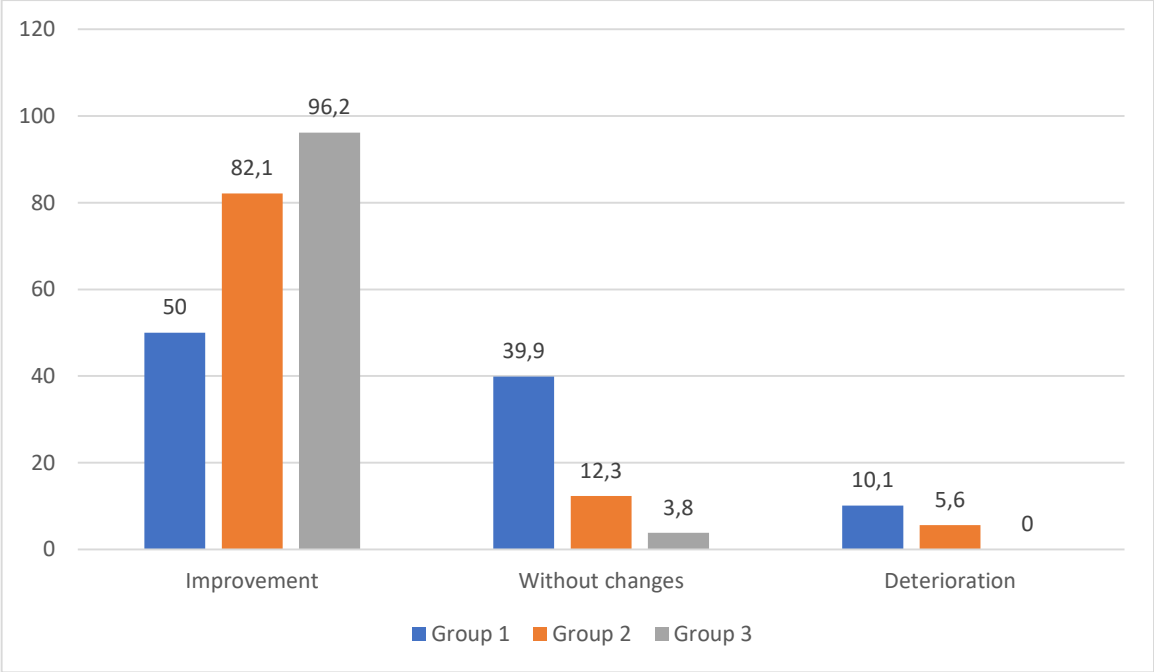


Figure 3.10 Manifestations of pain on palpation m. temporalis anterior 7 years after treatment

The study of manifestations of pain on palpation m. temporalis medialis indicated that after treatment Improvement was observed in group 1 in 118 (54.1%) patients, in group 2 - in 172 patients (88.2%). Most often, Improvement was noted For the patients of group 3 - in 229 cases (97.9%) (Figure 3.11). The value of this indicator was statistically significantly higher ($p<0.05$) than the corresponding levels in Groups 1 and 2. There were no changes in group 1 in 70 (32.1%) patients, in group 2 - in 20 patients

(10.3 %), in group 3 - in 5 patients (2.1%), while the levels of indicators in Groups 2 and 3 were statistically significantly lower ($p<0.05$) than in group 1.

Deterioration was observed in group 1 - in 30 (13.8%) patients, in group 2 - in 3 patients (1.5%), in group 3 there was no deterioration in the manifestation of pain in this area.

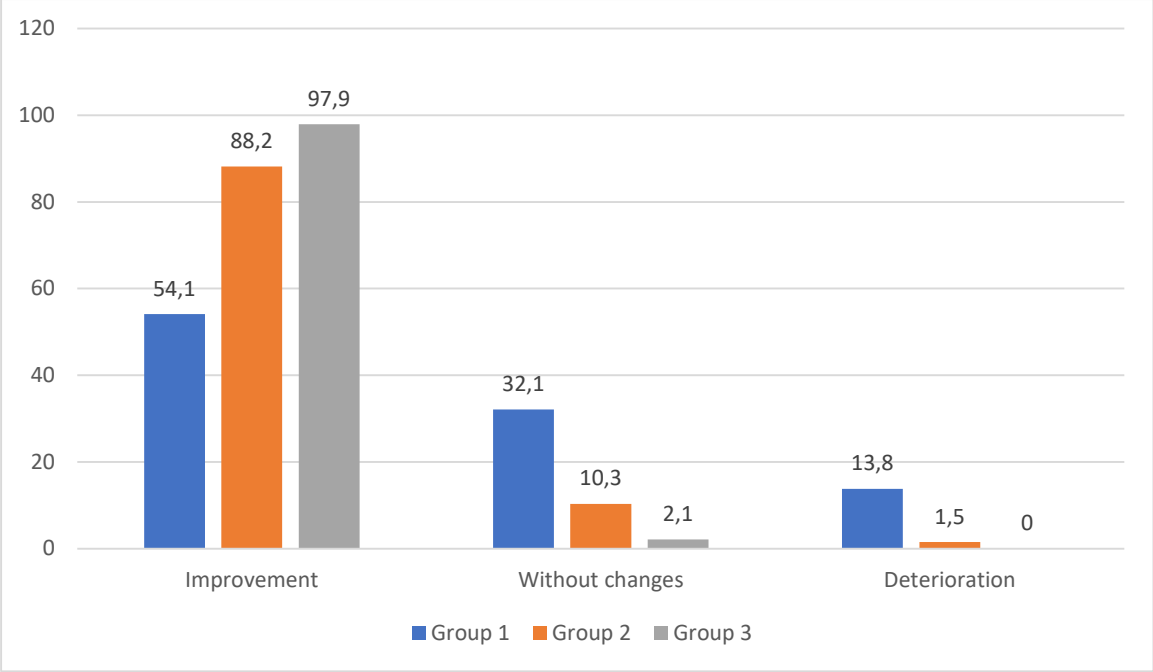


Figure 3.11 Manifestations of pain on palpation m. temporalis medialis after treatment

Further observation showed that the identified ratios of manifestations of pain m. temporalis medialis in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.6, figure 3.12).

Table 3.6 The dynamics of pain on palpation m. temporalis medialis

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	121	55,5	169	86,7*	320	98,7*
Without changes	69	31,7	19	9,7*	4	1,3*#
Deterioration	28	12,8	7	3,6*	-	-
Three years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Improvement	114	52,3	170	87,2*	227	97,0*
Without changes	72	33,0	20	10,3*	7	3,0*
Deterioration	32	14,7	5	2,5*	-	-
Five years after						
Improvement	118	54,1	162	83,1*	220	94,0*
Without changes	68	31,2	27	13,8*	12	5,1*#
Deterioration	32	14,7	6	3,1*	2	0,9*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

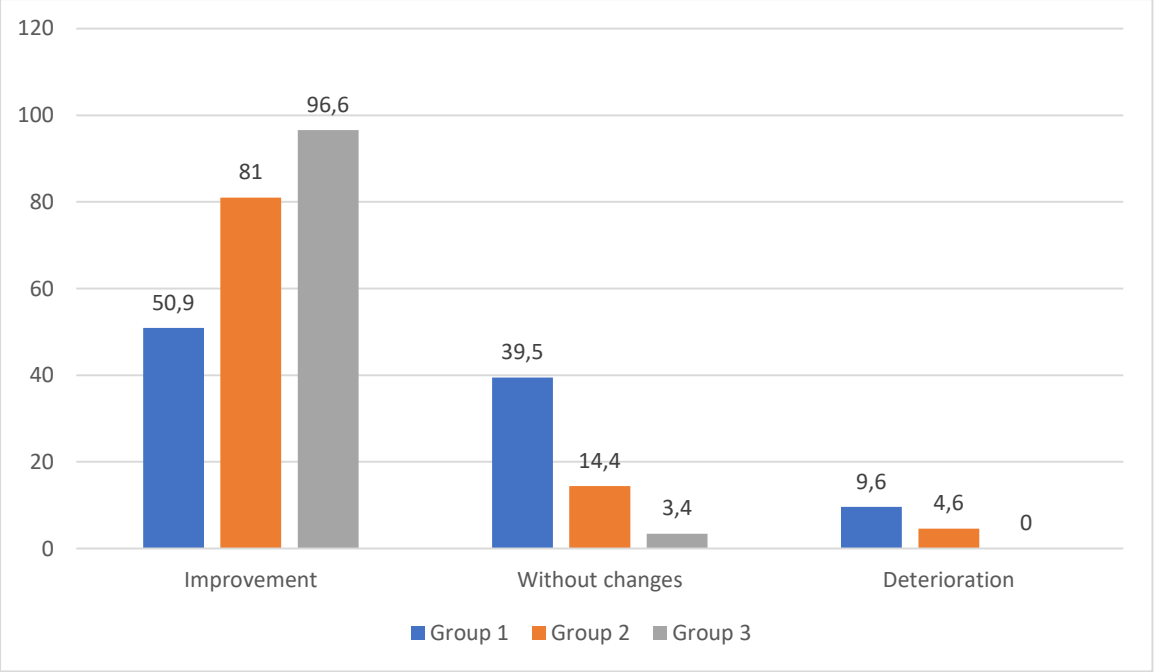


Figure 3.12 Manifestations of pain on palpation m. temporalis medialis 7 years after treatment

Assessment of pain on palpation m. temporalis posterior made it possible to establish that after the treatment Improvement was observed in 130 (59.6%) patients of the first group, while in the second and third Groups the value of this indicator was statistically significantly higher ($p<0.05$) - respectively 172 (88.2%) and 222 cases (94.9%) (Figure 3.13). No changes were found in group 1 in 65 (29.8%) patients, in

group 2 - in 20 patients (10.3%). The value of this indicator in group 3 was 3.8% and was statistically significantly lower ($p<0.05$) than in the first two Groups. Deterioration was detected in group 1 in 23 (10.5%) patients, while in the second and third groups only in isolated cases: in group 2 - in 2 patients (1.0%), in group 3 - in 3 patients (1.3%.

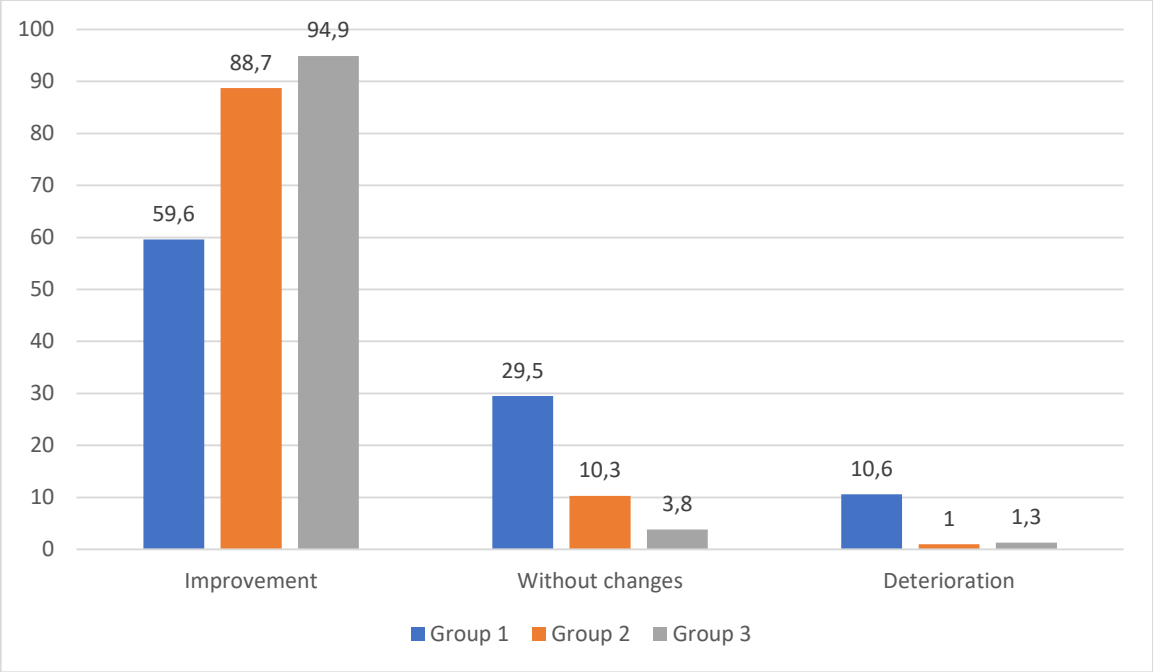


Figure 3.13 Manifestations of pain on palpation m. temporalis posterior after treatment

Further observation showed that the identified ratios of manifestations of pain m. temporalis posterior in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.7, figure 3.14).

Table 3.7 The dynamics of pain on palpation m. temporalis posterior

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	126	57,8	170	87,2*	227	97,0*
Without changes	69	31,7	20	10,3*	5	2,1*#
Deterioration	23	10,5	5	2,5*	2	0,9*

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Three years after						
Improvement	118	54,1	167	85,6*	230	98,3*
Without changes	70	32,1	15	7,7*	4	1,7*
Deterioration	30	13,8	13	6,7	-	-
Five years after						
Improvement	112	51,3	162	83,1*	229	97,9*
Without changes	81	37,2	20	10,3*	5	2,1*
Deterioration	25	11,5	13	6,6	-	-

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

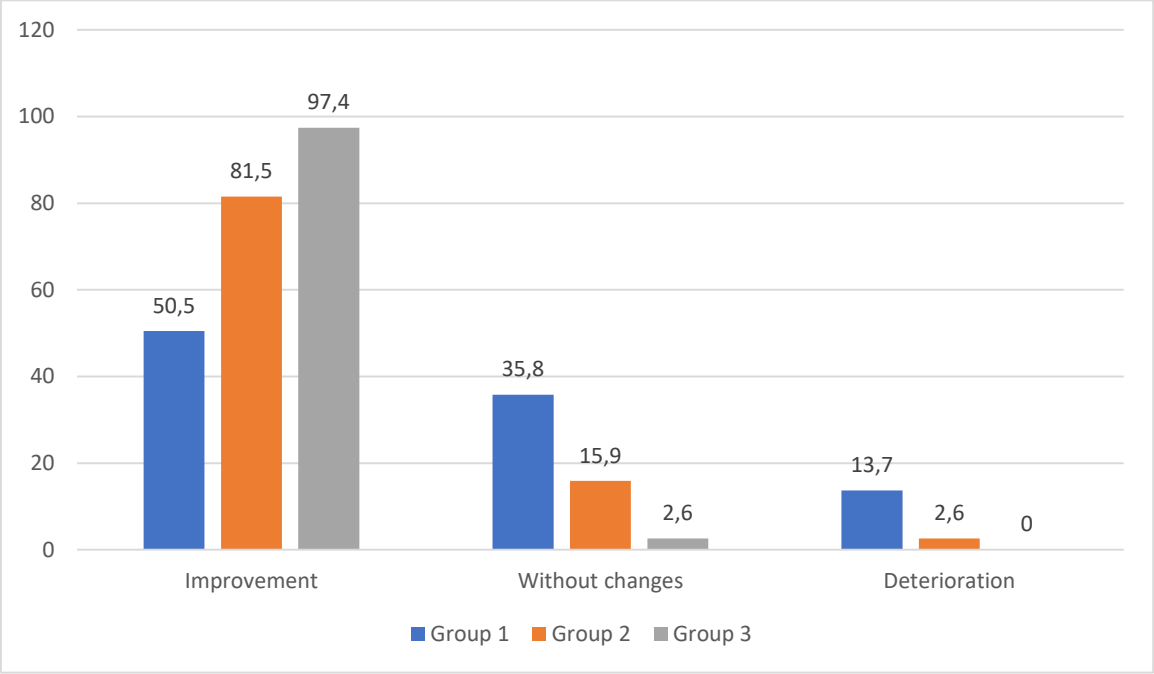


Figure 3.14 Manifestations of pain on palpation m. temporalis posterior 7 years after treatment

The study of the dynamics of pain on palpation m. mylohyoideus showed that after treatment Improvement was noted in 27 (12.4%) patients of group 1, in Groups 2

and 3 it was statistically significantly (p<0.95) more often - in 160 (82.1%) and 179 cases, respectively (76.5%) (Figure 3.15). There were no changes in group 1 in 150 (68.8%) patients, in group 2 - in 32 patients (16.4%), in group 3 - in 40 patients (17.1%). Deterioration of manifestations of this sign was observed in group 1 in 41 (18.8%) patients, in group 2 - in 3 (1.5%), in group 3 in 15 cases (6.4%). At the same time, the values of all indicators in Groups 2 and 3 were statistically significantly (p<0.05) lower than those in group 1.

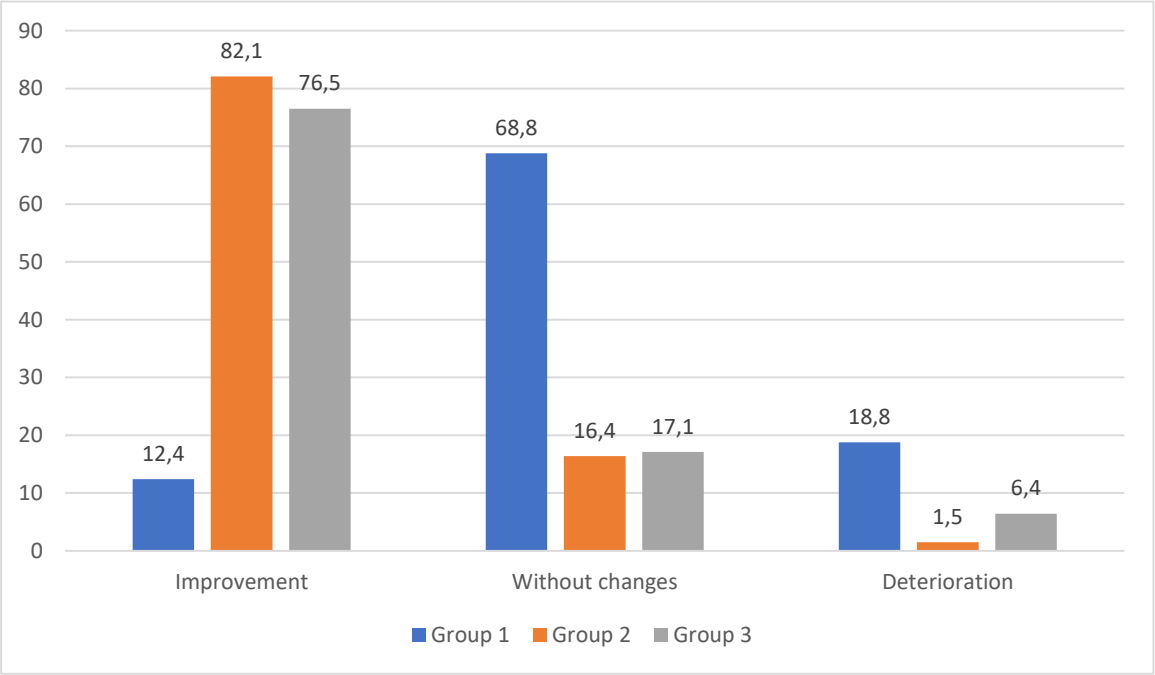


Figure 3.15 Manifestations of pain on palpation m. mylohyoideus after treatment

Further observation showed that the identified ratios of manifestations of pain m. mylohyoideus in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher (p<0.05) than in group 1 at all times of the examination of patients (table 3.8, figure 3.16).

Table 3.8 The dynamics of pain on palpation m. mylohyoideus

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						

Improvement	32	14,7	166	85,1*	172	73,5*
Without changes	148	67,9	22	11,3*	50	21,4*
Deterioration	38	17,4	7	3,6*	12	5,1*
Three years after						
Improvement	44	20,2	175	89,7*	167	71,4*
Without changes	134	61,5	18	9,2*	44	18,8*
Deterioration	40	18,3	2	1,0*	23	9,8*#
Five years after						
Improvement	51	23,4	170	87,2*	172	73,5*
Without changes	113	51,8	20	10,3*	34	14,5*
Deterioration	54	24,8	5	2,5*	28	12,0*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

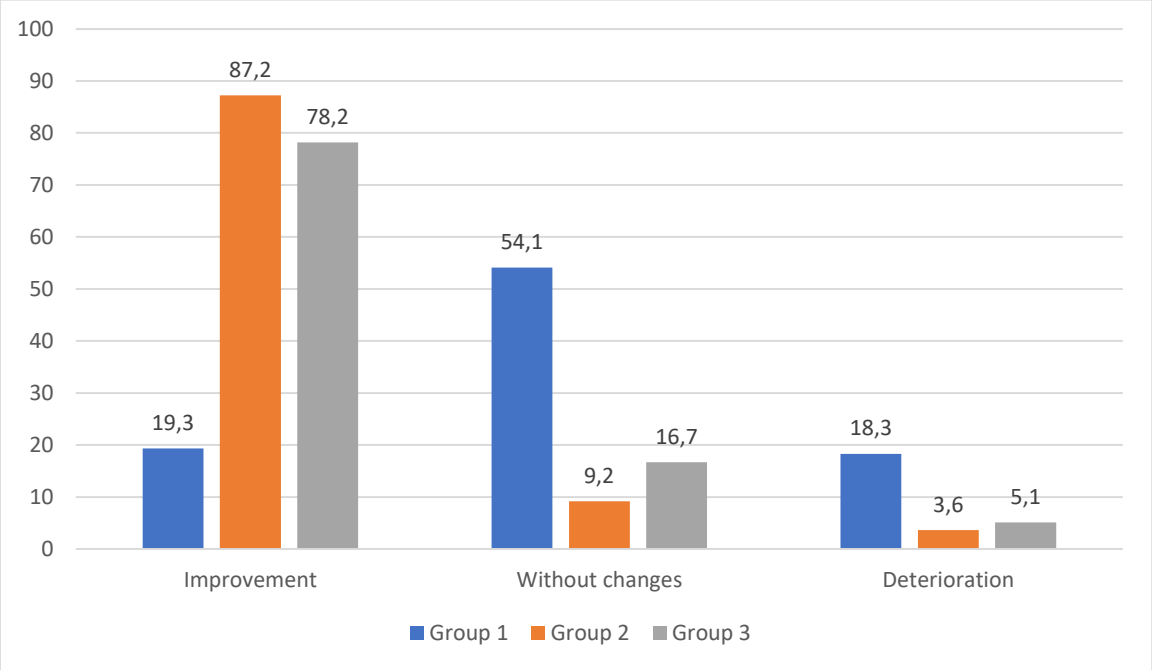


Figure 3.16 Manifestations of pain on palpation m. mylohyoideus 7 years after treatment

Analysis of the manifestations of pain on palpation m. digastricus showed that after treatment Improvement was observed in group 1 - in 38 (17.5%) patients, in Groups 2 and 3 - significantly more often ($p<0.05$) - respectively in 114 patients (58.5%) and in 183 patients (78.3%) (Figure 3.17).

No changes were noted - in group 1 in 150 (68.8%) patients, in group 2 - in 71 patients (36.4%), in group 3 - in 45 patients (19.2%). Deterioration was observed in group 1 - in 30 (13.7%) patients, in group 2 - in 10 cases (5.1%), in group 3 - only in 6 patients (2.5%). The last value of the indicator was statistically significantly lower ($p<0.05$) than in group 1.

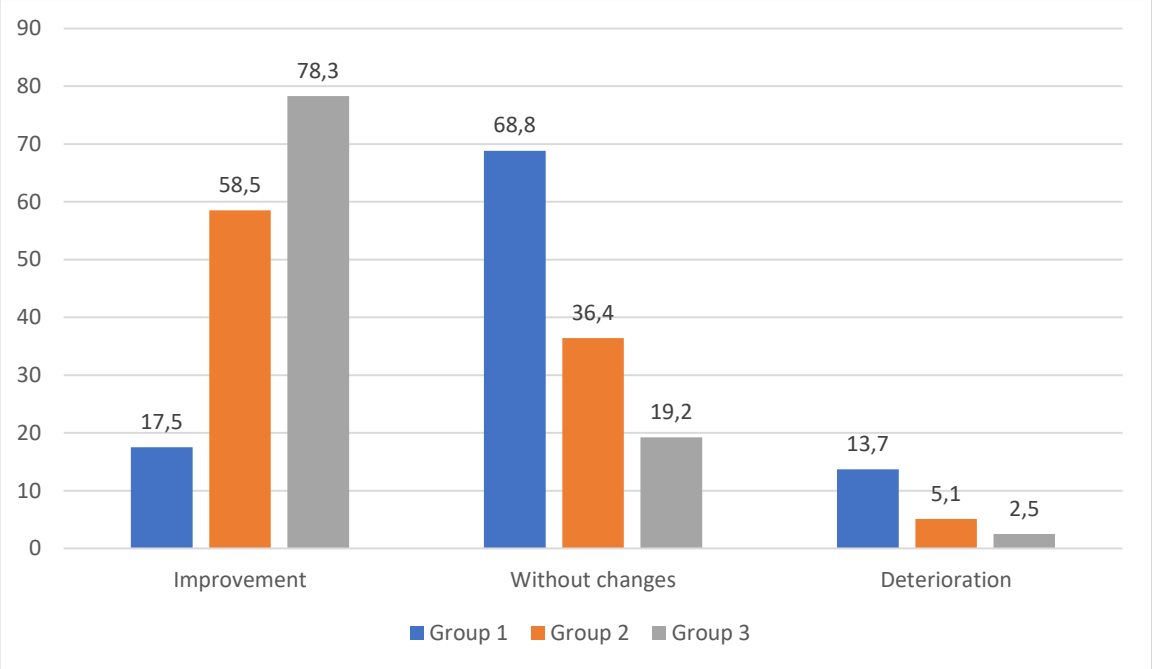


Figure 3.17 Manifestations of pain on palpation m. digastricus after the treatment

Further observation showed that the identified ratios of manifestations of pain m. digastricus in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.9, figure 3.18).

Table 3.9 The dynamics of pain on palpation m. digastricus

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	42	19,3	125	64,1*	188	80,4*#
Without changes	155	71,1	65	33,3*	37	15,8*#
Deterioration	21	9,6	5	2,6*	9	3,8*
Three years after						
Improvement	43	19,7	127	65,1*	191	81,7*#

Without changes	148	67,9	63	32,4*	38	16,2*#
Deterioration	27	12,4	5	2,5*	5	2,1*
Five years after						
Improvement	54	24,8	126	64,6	193	82,5*#
Without changes	145	66,5	62	31,8	33	14,1*#
Deterioration	19	8,7	7	3,6	8	3,4

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

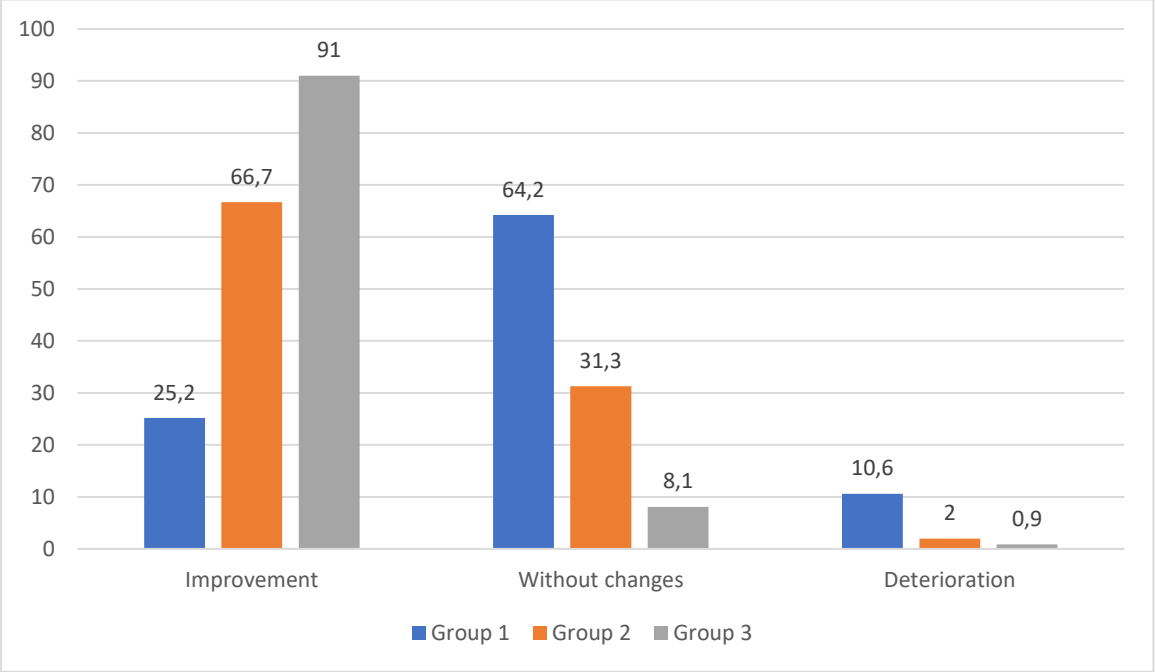


Figure 3.18 Manifestations of pain on palpation m. digastricus 7 years after treatment

Assessment of pain on palpation m. suprahyoidale indicated that after treatment Improvement was observed in group 1 - in 30 (13.8%) patients, in group 2 - statistically significantly more often ($p<0.05$) in 110 patients (56.4%), in group 3 - significantly more often than in both Groups - the value of the indicator was 73.9% (173 cases) (Figure 3.19). There were no changes in 148 (67.8%) patients of the first group, 71 patients (36.4%) in the second group, and 50 patients (21.4%) of the third group. Deterioration of manifestations of pain on palpation m. suprahyoidale was detected - in group 1 - in 40 (18.4%) cases, in 14 patients (7.2%) of the second group and in 11 patients (4.7%) of the third group. There were no significant differences in the latter indicator.

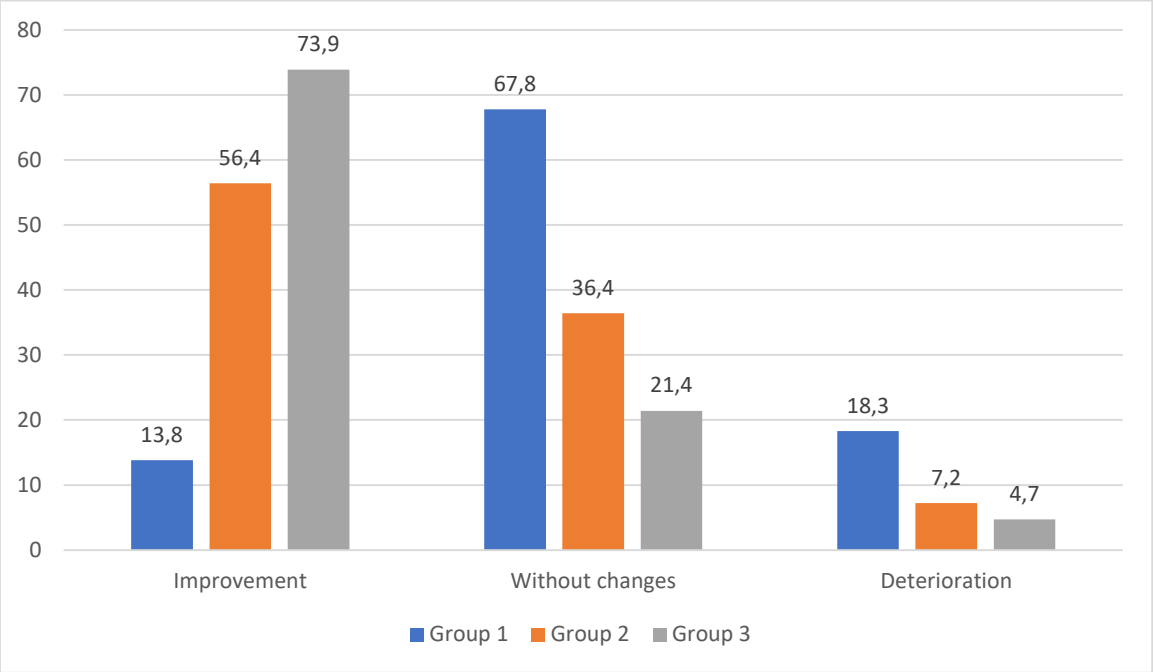


Figure 3.19 Manifestations of pain on palpation m. suprahyoidal after treatment

Further observation showed that the identified ratios of manifestations of pain m. suprahyoidale in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.10, figure 3.20).

Table 3.10 The dynamics of pain on palpation m. suprahyoidal

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	37	17,0	117	60,0*	176	75,2*
Without changes	143	65,6	67	34,4*	49	20,9*
Deterioration	38	17,4	11	5,6*	9	3,9*
Three years after						
Improvement	42	19,3	128	62,6*	183	78,2*
Without changes	146	67,0	65	33,3*	40	17,1*#
Deterioration	30	13,8	8	4,1*	11	4,7*
Five years after						
Improvement	46	21,1	129	66,2*	194	82,9*#

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Without changes	147	67,4	57	29,2*	32	13,7*#
Deterioration	25	11,5	9	4,6*	8	3,4*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

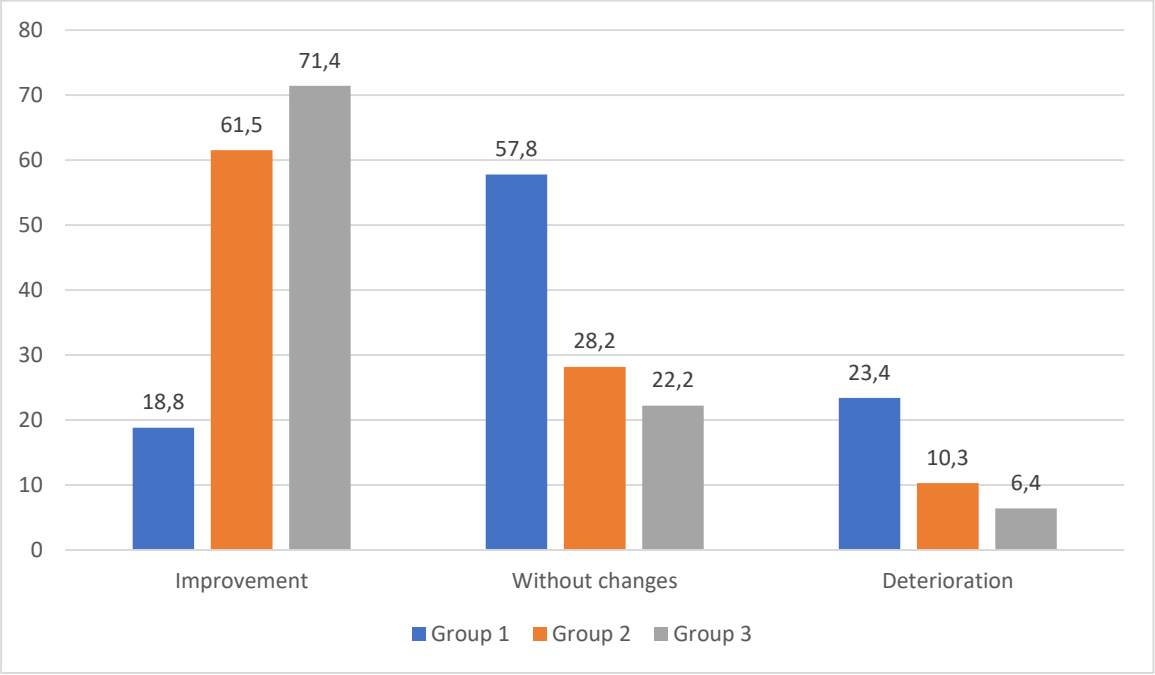


Figure 3.20 Manifestations of pain on palpation m. suprahyoidale 7 years after treatment

Evaluation of the dynamics of manifestations of pain on palpation m. infrahyoidale indicated that after treatment Improvement was observed in group 1 - in 41 (18.8%) patients, in Groups 2 and 3 statistically significantly more often ($p<0.05$) - respectively in 120 (61.5%) and 167 cases (71.4%) (Figure 3.21). There were no changes - in 126 (57.8%) patients of the first group, in group 2 - in 55 patients (28.2%), in group 3 - in 52 patients (22.2%). Deterioration was detected in group 1 - in 51 (23.4%) patients, in group 2 - in 20 patients (10.3%), the value of this indicator in group 3 was significantly lower than in the first group - 15 cases (6 ,4%).

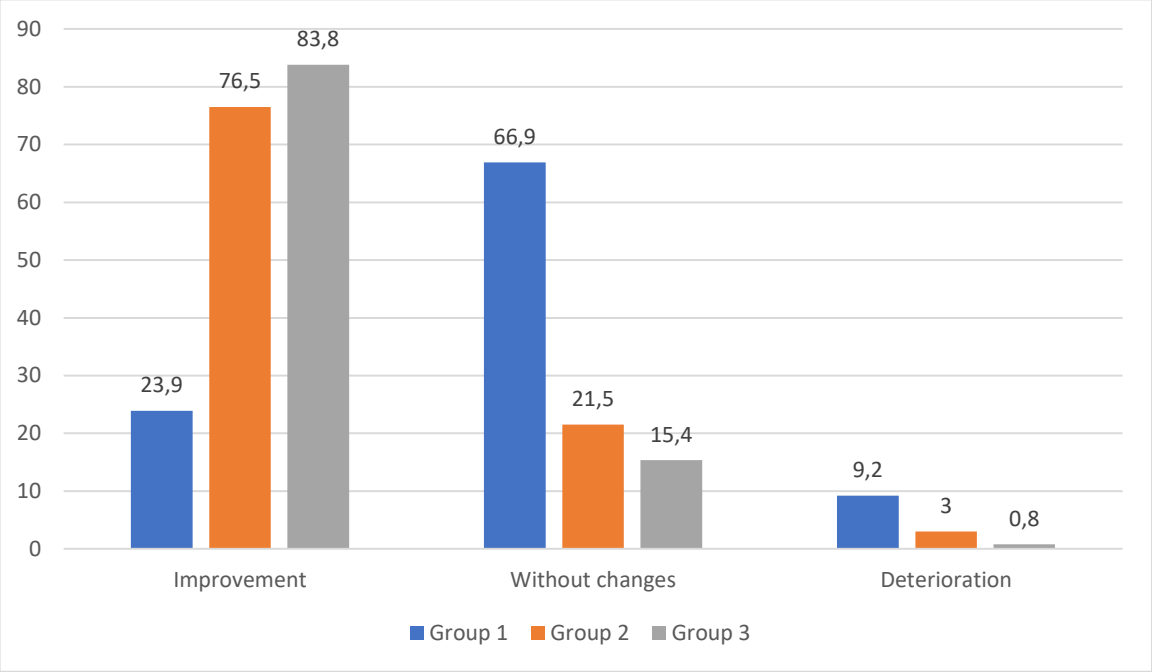


Figure 3.21 Manifestations of pain on palpation m. infrahyoidal after treatment

Further observation showed that the identified ratios of manifestations of pain m. infrahyoidale in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.11, figure 3.22).

Table 3.11 The dynamics of pain on palpation m. infrahyoidal

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	43	19,8	125	64,1*	171	73,1*
Without changes	137	62,8	50	25,7*	52	22,2*
Deterioration	38	17,4	20	10,2*	11	4,7*#
Three years after						
Improvement	46	21,1	134	68,7*	178	76,1*
Without changes	134	61,5	47	24,1*	44	18,8*
Deterioration	38	17,4	14	7,2*	12	5,1*
Five years after						
Improvement	55	25,3	135	69,2*	182	77,8*
Without changes	130	59,6	50	25,7*	43	18,4*

Deterioration	33	15,1	10	5,1*	9	3,8*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

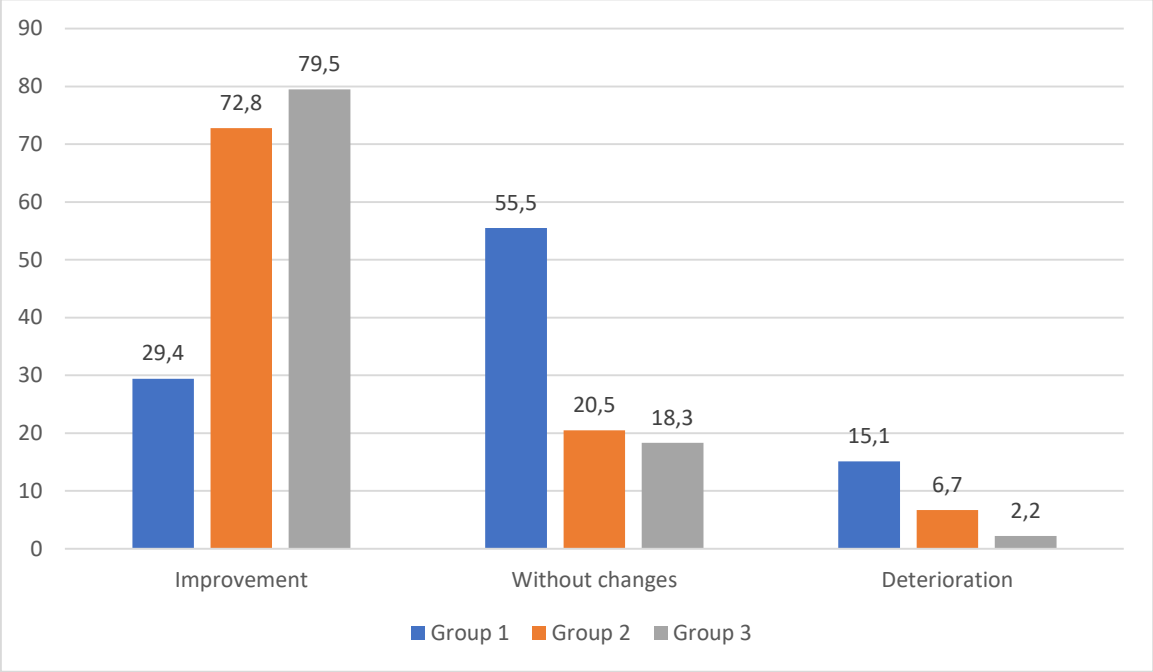


Figure 3.22 Manifestations of pain on palpation m. infrahyoidal after 7 years

3.2 Evaluation of pain on palpation of the postural muscles

The study of pain on palpation m. omohyoideus showed that after treatment Improvement was noted only in 50 (22.5%) patients of group 1, while in Groups 2 and 3 the values of these indicators were statistically significantly higher: Improvement was observed in 140 patients (71.8%) of the second group and in 200 patients of the third group (85.5%) (Figure 3.23). In both Groups, the levels of this indicator were statistically significantly higher ($p<.05$) than in group 1. There were no changes in the appearance of pain in this area in group 1 - in 130 (59.2%) patients, in group 2 - significantly less frequently ($p<0.05$) - in 44 patients (22.6%). The minimum value of this indicator in group 3 was 10.7% (25 patients), which was statistically significantly lower than in Groups 1 and 2. Deterioration was noted in group 1 - in 38 (17.5%) patients, in Groups 2 and 3 significantly less frequently: in 11 (5.6%) and 9 cases (3.8%).

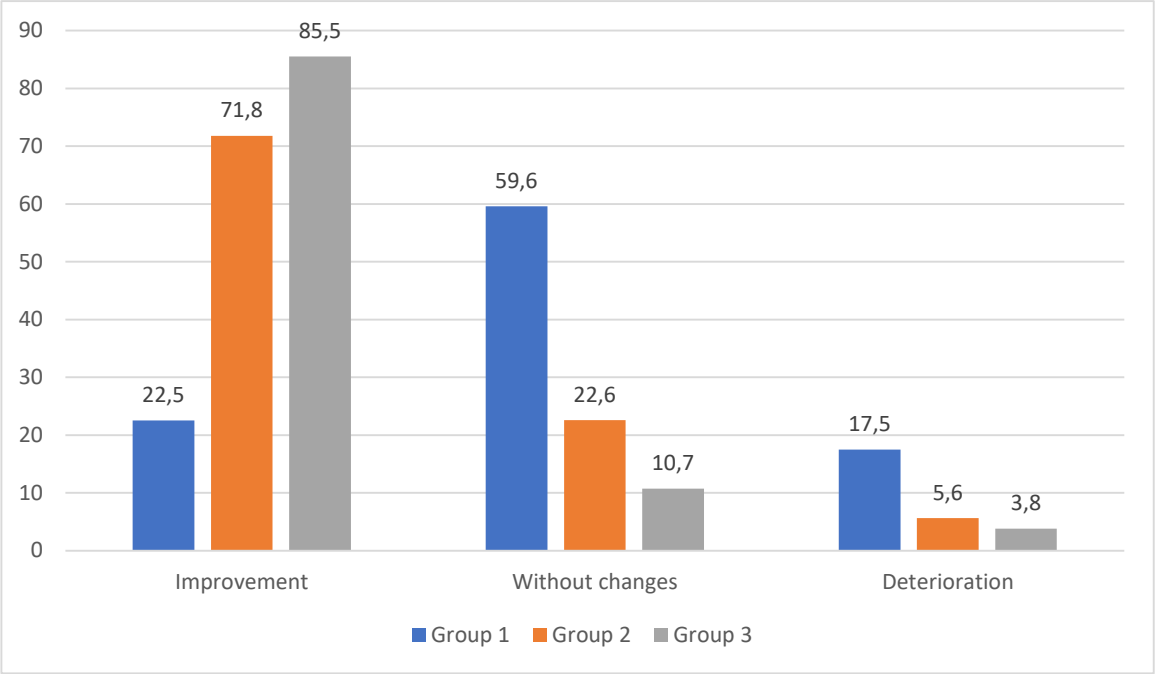


Figure 3.23 Manifestations of pain on palpation m. omohyoideus after treatment

Further observation showed that the identified ratios of manifestations of pain m. omohyoideus in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.12, figure 3.24).

Table 3.12 The dynamics of pain on palpation m. omohyoideus

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	50	22,9	140	72,8*	202	86,3*
Without changes	129	59,2	43	22,1*	25	10,7*#
Deterioration	51	17,9	10	5,1*	7	3,0*
Three years after						
Improvement	47	21,6	132	67,7*	198	84,6*#
Without changes	120	55,0	55	28,2*	30	12,4*#
Deterioration	51	23,4	8	4,1*	6	4,7*
Five years after						
Improvement	44	20,2	130	66,7*	194	82,9*#
Without changes	119	54,6	42	21,5*	29	12,4*

Deterioration	55	25,2	23	11,8*	11	4,7*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

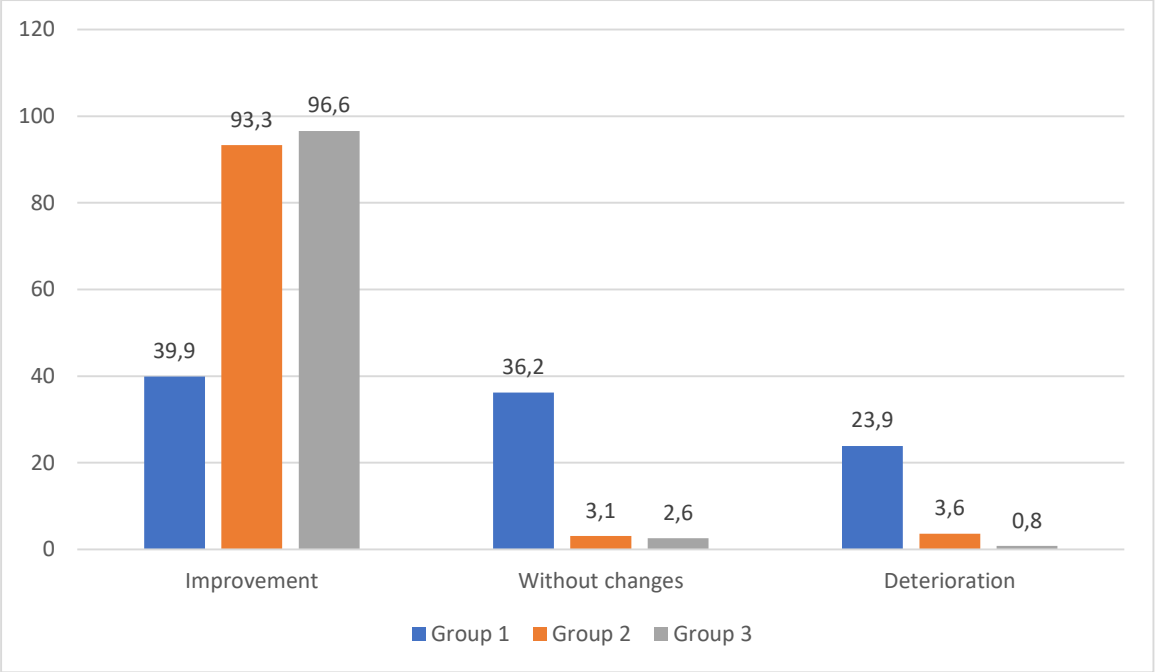


Figure 3.24 Manifestations of pain on palpation m. omohyoideus seven years' after

Assessment of the severity of pain on palpation m. sternocleidomastoideus testified that after the treatment, Improvement was detected in group 1 - in 28 (12.8%) patients, in group 2 much more often - in 112 patients (57.4%), in group 3 - in 170 patients (72.6%) (Figure 3.25). Thus, the last two indicators were statistically significantly higher ($p<0.05$) than in group 1. There were no changes in 145 (66.5%) patients of the first group, in 67 cases (34.4%) in the second group and in 54 patients (23.1%) of the third group. Deterioration was observed in group 1 - in 45 (20.4%) patients, while in Groups 2 and 3 the values of this indicator were significantly lower ($p<0.05$): 16 (8.2%) and 10 (4.3%) cases.

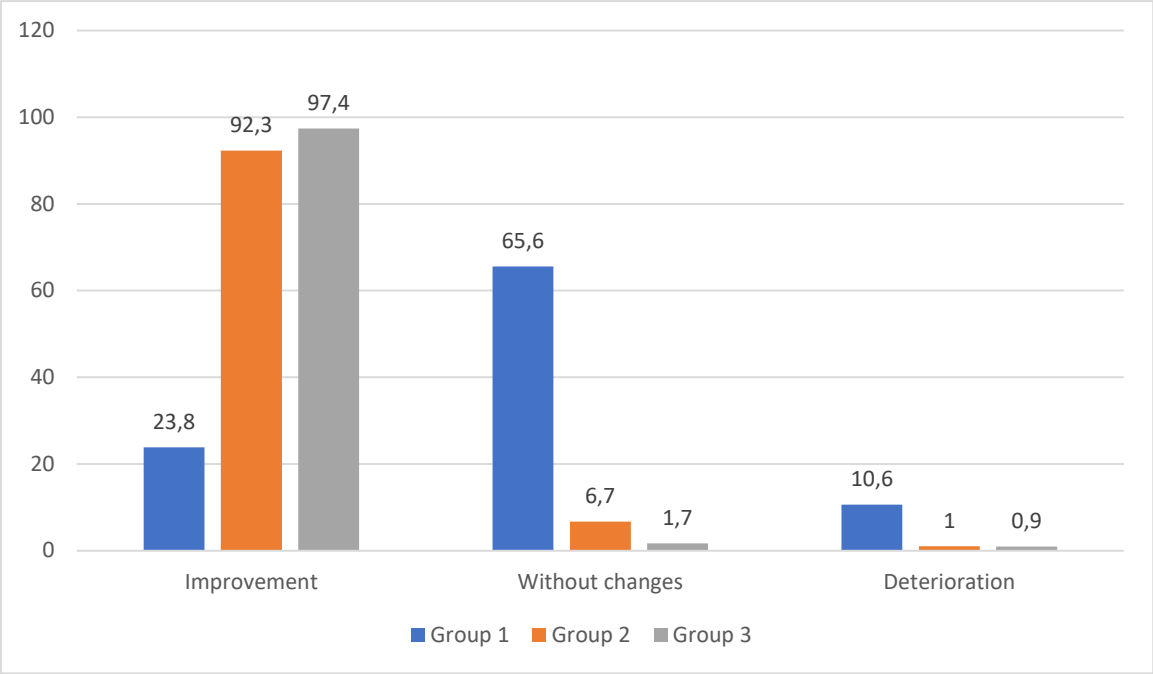


Figure 3.25 Manifestations of pain on palpation m. sternocleidomastoideus after treatment

Further observation showed that the identified ratios of manifestations of pain m. sternocleidomastoideus in Groups of patients persisted after 1, 3 and 5 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.13, figure 3.26).

Table 3.13 The dynamics of pain on palpation m. sternocleidomastoideus

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	35	16,1	119	61,1*	173	73,9*
Without changes	143	65,6	63	32,3*	53	22,7*
Deterioration	40	18,3	13	6,6	8	3,4*
Three years after						
Improvement	40	18,3	120	61,5*	180	76,9*
Without changes	146	67,0	65	33,4*	44	18,8*
Deterioration	32	14,7	10	5,1*	10	4,3*
Five years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Improvement	44	20,2	131	67,2*	190	81,2*
Without changes	147	67,4	53	27,2*	37	15,8*
Deterioration	27	12,4	11	5,6	7	3,0*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

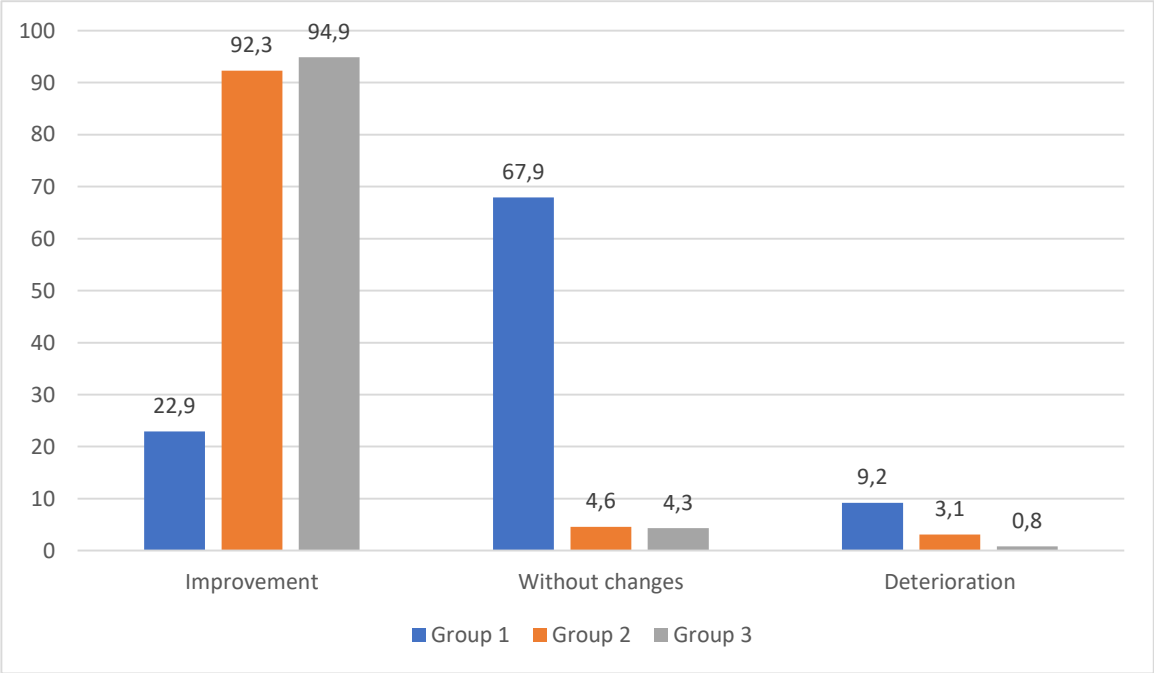


Figure 3.26 Manifestations of pain on palpation m. sternocleidomastoideus 7 years after treatment

The study of the manifestations of the dynamics of pain during palpation in the neck and shoulders showed that after treatment, the frequency of detection of this symptom significantly decreased in Groups 2 and 3. Thus, Improvement was observed in group 2 - in 112 patients (57.4%), in group 3 - in 170 patients (72.6%), which was significantly ($p<0.05$) higher than in the first group - 28 (12.8%) cases (Figure 3.27). There were no changes in the manifestations of pain in this area in 150 (68.8%) patients of group 1, in group 2 it was significantly less expressed in 69 patients (35.4%), and in group 3 - in 53 patients (22.7%), statistically significantly less frequently ($p<0.05$) than in group 1. Deterioration was observed in group 1 in 40 (18.3%) patients, in group 2 - in 14 patients (7.2%), in group 3 - only in 11 cases (4.7%).

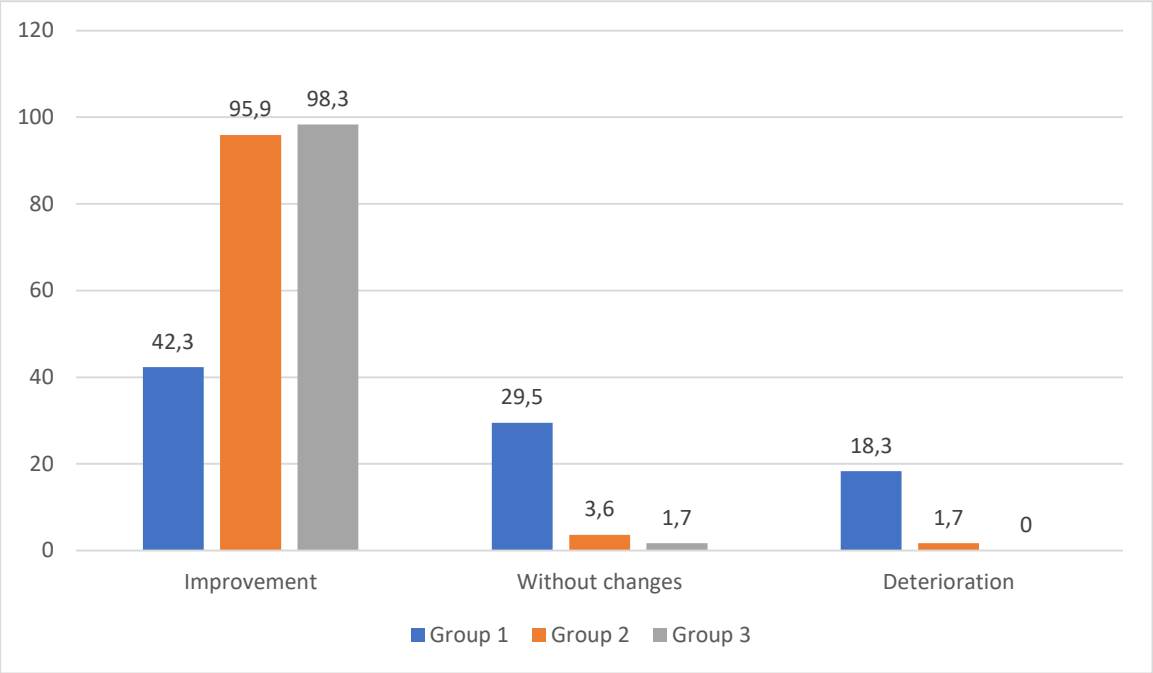


Figure 3.27 Manifestations of pain on palpation of the neck and shoulders after treatment

Further observation showed that the identified ratio of manifestations of pain on palpation in the neck and shoulders in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.14, figure 3.28)

Table 3.14 Dynamics of pain on palpation of the neck and shoulders

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	35	16,1	119	61,1*	173	73,9*
Without changes	145	66,5	65	33,3*	52	22,2*
Deterioration	38	17,4	11	5,6*	9	3,9*
Three years after						
Improvement	40	18,3	124	63,6*	180	76,9*
Without changes	148	67,9	63	32,3*	43	18,4*
Deterioration	30	13,8	8	4,1*	11	4,7*
Five years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Improvement	44	20,2	131	67,2*	190	81,2*
Without changes	149	68,3	55	28,2*	36	15,4*
Deterioration	25	11,5	9	4,6	8	3,4

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

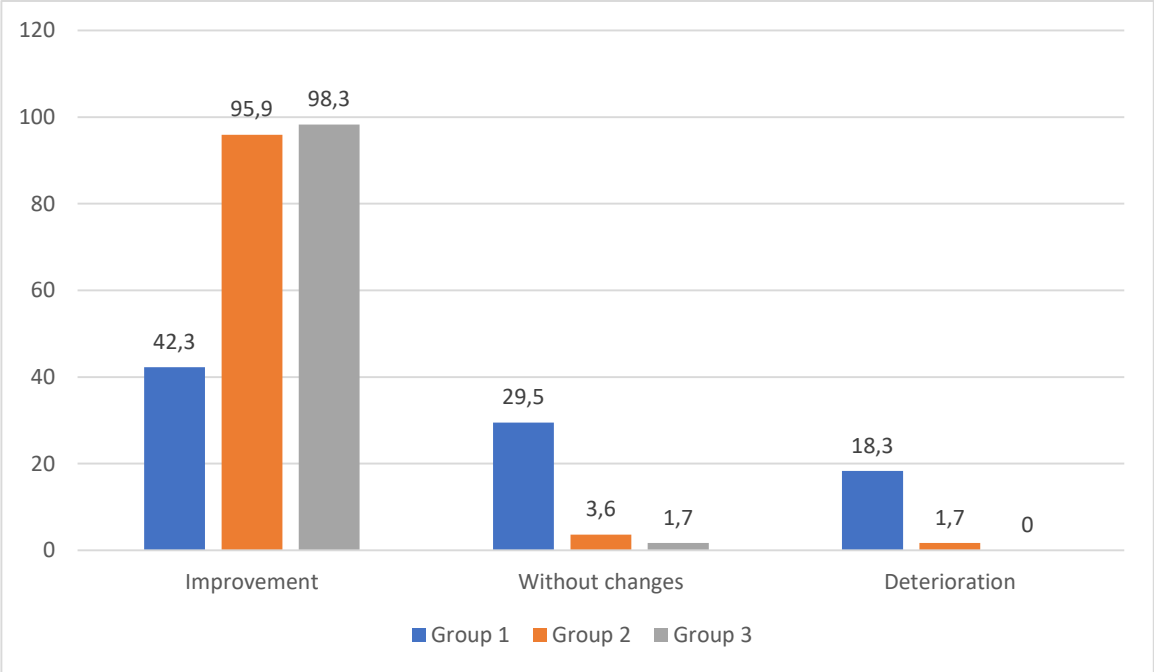


Figure 3.28 Manifestations of pain on palpation of the neck and shoulders 7 years after the treatment

Assessment of pain on palpation in the atlanto-occipital area revealed that after treatment Improvement was observed in group 1 - only in 25 (11.2%) patients, while for the patients of groups 2 and 3 the values of these indicators were statistically significantly higher ($p <0.05$) - 105 (53.8%) and 152 cases (65.0%)* (Figure 3.29). Without changes, there was a manifestation of pain in the atlanto-occipital area in group 1 in 148 (67.9%) patients, in group 2 much less frequently - in 70 patients (35.9%), in group 3 - in 66 patients (28.2%). %), which was statistically significantly less common ($p<0.05$) than in the first group. Deterioration was observed in group 1 - in 45 (20.6%) patients, in group 2 - in 20 patients (10.3%), in group 3 - in 16 patients (6.8%). In this case, the revealed differences did not reach statistical significance.

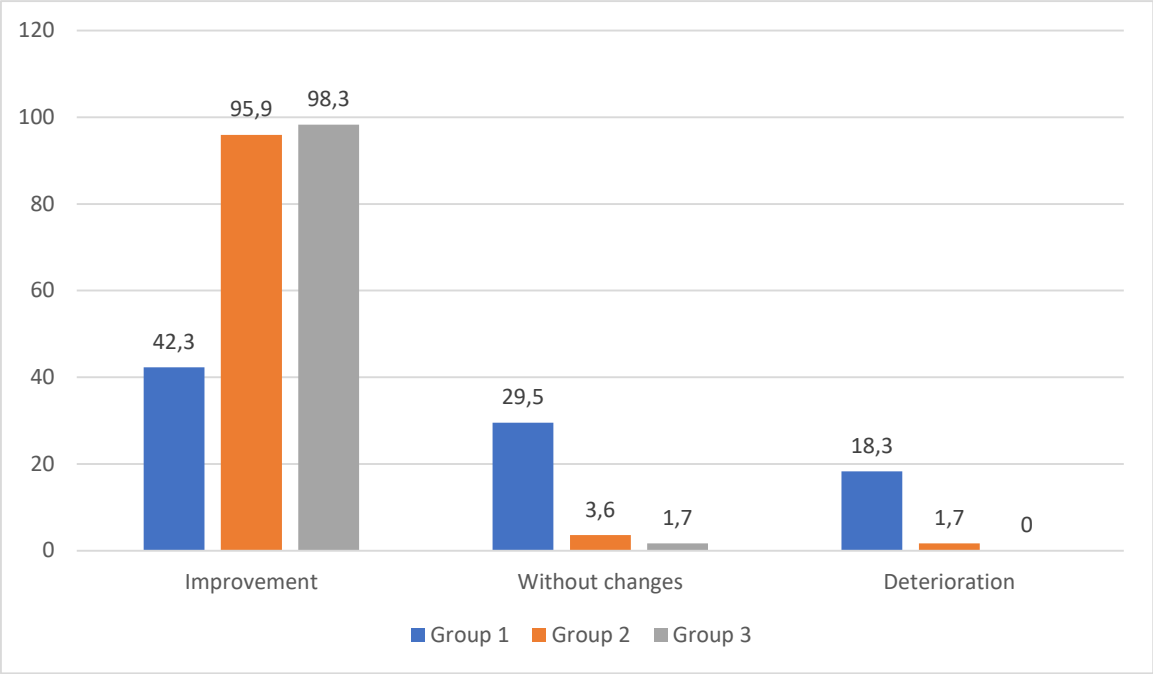


Figure 3.29 Manifestations of pain on palpation of the atlanto-occipital area after treatment

Further observation showed that the revealed ratios of manifestations of pain in the atlanto-occipital area in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the assessment of pain syndrome was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination of patients (table 3.15, figure 3.30).

Table 3.15 Dynamics of pain on palpation in the atlanto-occipital area

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One year after						
Improvement	30	13,7	115	59,0*	161	68,8*
Without changes	146	67,0	56	28,7*	55	23,5*
Deterioration	42	19,3	24	12,3	18	7,7*
Three years after						
Improvement	26	11,9	133	68,2*	166	70,9*
Without changes	152	69,7	32	16,4*	43	18,4*
Deterioration	40	18,4	30	15,4	25	10,7
Five years after						
Improvement	39	17,9	138	70,8*	172	73,5*

Without changes	141	64,6	29	14,7*	32	13,7*
Deterioration	38	17,5	28	14,4	30	12,8*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

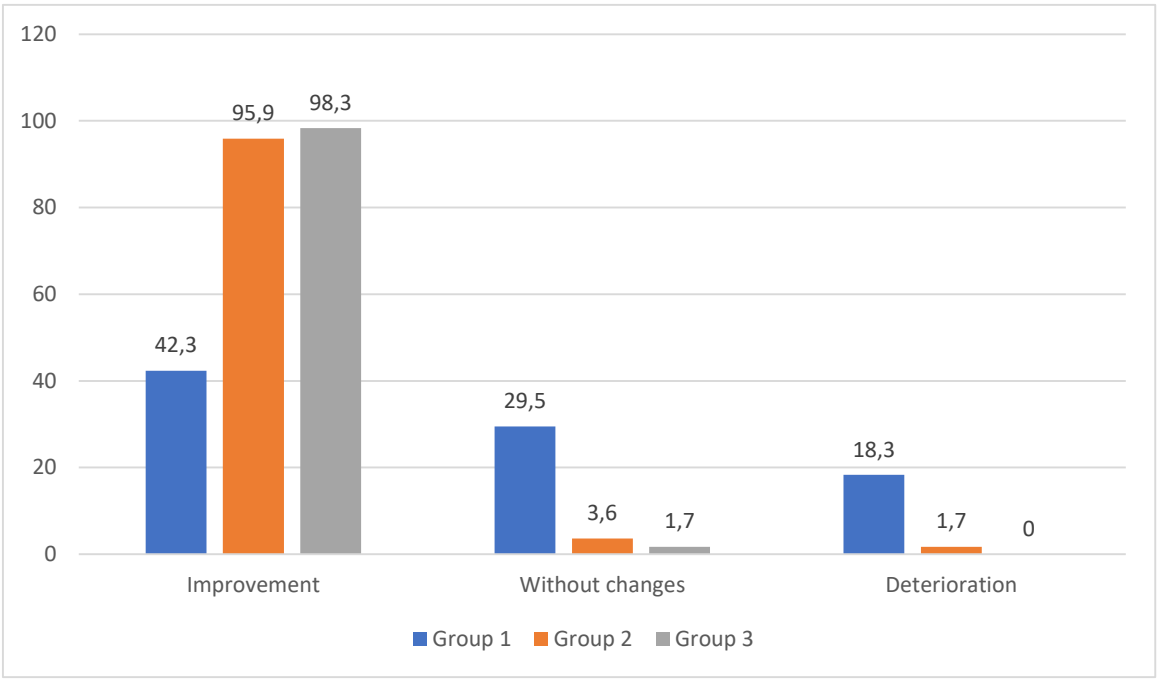


Figure 3.30 Manifestations of pain on palpation of the atlanto-occipital area after treatment

3.3 Dynamics of the occlusal index

The assessment of the occlusal index showed that before the start of treatment, the values of this index were similar in all three Groups of patients, ranging from 2.18 to 2.26. 1 year after the start of treatment, the values of this indicator significantly decreased in the second and third Groups, where their values were 1.15±0.16 and 0.92±0.09, respectively, and were statistically significantly lower ($p<0.05$) in terms of compared with that in group 1 - 2.16±0.21 (Figure 3.31).

Subsequently, by the 3rd year of observation, a further decrease in this indicator was noted, the level of which at this time was statistically significantly less than the corresponding values in Groups 1 and 2.

The revealed ratios were maintained after 5 and 7 years, at the last examination, the value of this indicator was 1.78 ± 0.08 For the patients of the first group, in group 2 it was statistically significantly lower - 0.90 ± 0.14, and in group 3 the level of occlusive index was 0.85±0.21 and was statistically significantly less ($p<0.05$) than the values in Groups 1 and 2.

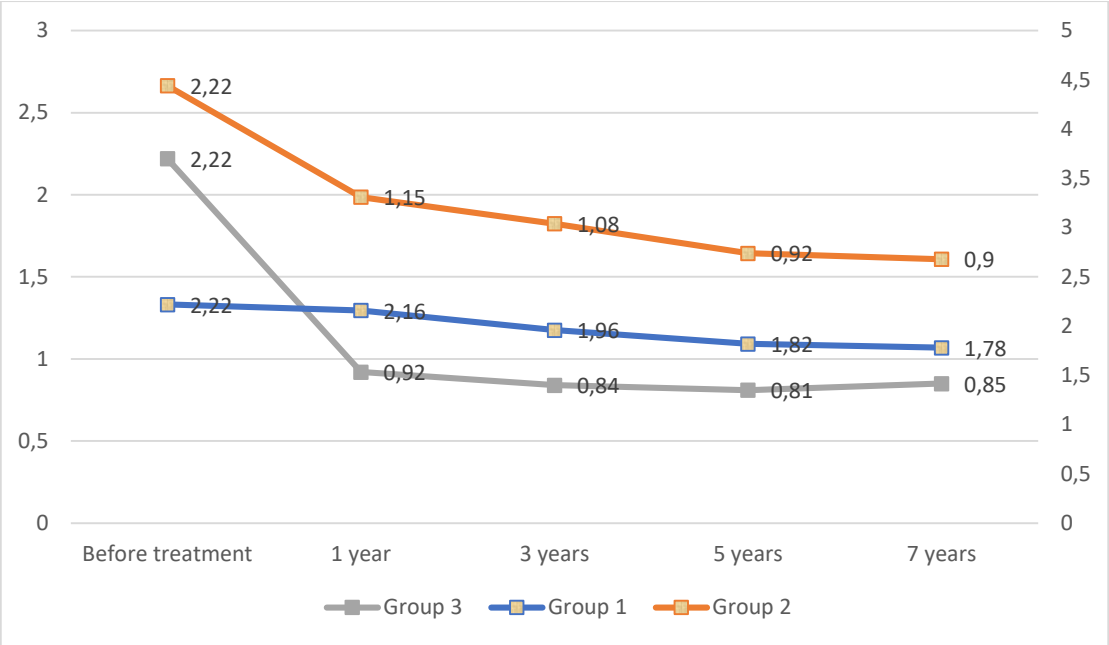


Figure 3.31 Dynamics of the occlusal index

3.4 Dynamics of clinical manifestations of pathology of the temporomandibular joint

An assessment of the severity of pain in the TMJ area showed that before the start of treatment, the values of this indicator were similar in all three groups of patients, ranging from 8.36 to 8.72 points.

One year after the start of treatment, the values of this indicator significantly decreased in the second and third Groups, where their values were 6.18±0.55 and 5.84±0.42 points, respectively, and were statistically significantly lower ($p<0.05$) compared with that in group 1 - 8.06±0.32 points (Figure 3.32).

Subsequently, by the 3rd year of observation, a further decrease in this indicator was noted, the level of which at this time was statistically significantly less than the corresponding values in Groups 1 and 2.

The revealed ratios were maintained after 5 and 7 years, at the last examination, the value of this indicator was 6.52 ± 0.44 points for the patients of the first group, in group 2 it was statistically significantly lower - 3.82 ± 0.37 points, and in group 3 the level of pain assessment according to VAS was 2.65±0.29 points and was statistically significantly less ($p<0.05$) than the values in Groups 1 and 2.

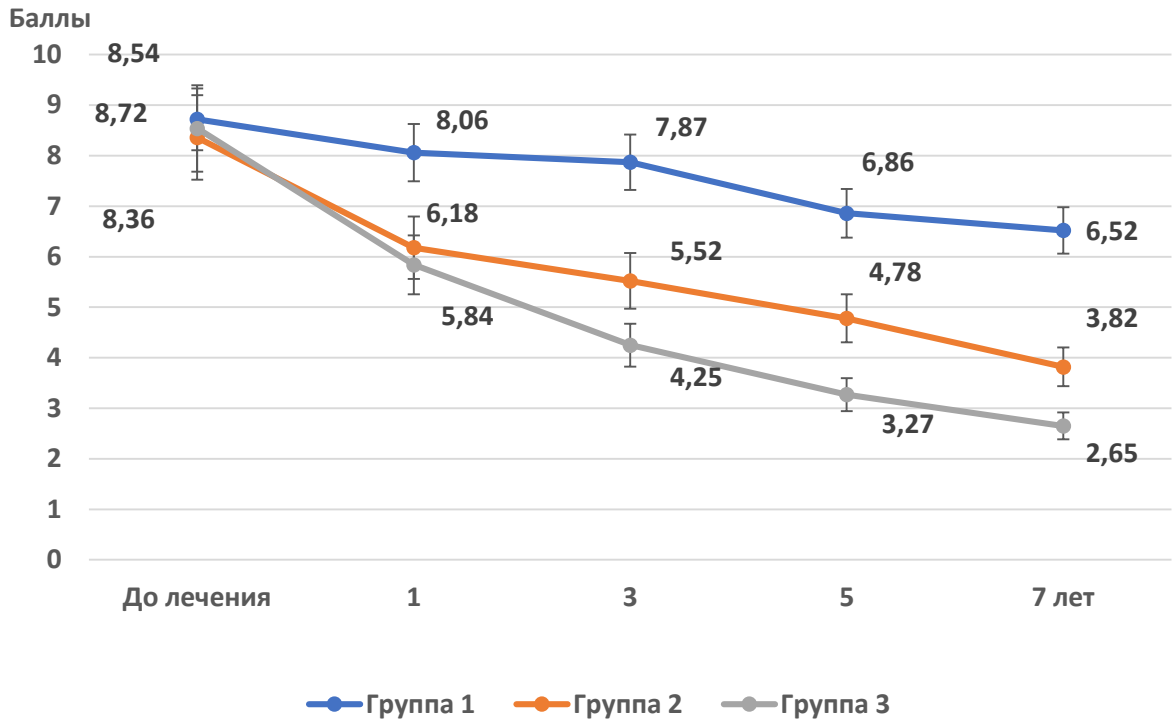


Figure 3.32 Dynamics of pain assessment according to VAS

An assessment of the presence of a click in the TMJ showed that before treatment it was detected in group 1 - in 186 (85.3%) patients, in group 2 - in 178 patients (91.3%), in group 3 - in 209 patients (89.3%). 3%) (Figure 3.33).

After 1 year - the presence of this symptom was reported by 162 (74.3%) patients of the first group, while in Groups 2 and 3 the values of these indicators were significantly lower ($p<0.05$) and amounted to 47.2%, respectively, in group 3 - in 90 patients (38.7%) ($p<0.05$).

After 3 and 5 years, the revealed ratios of these indicators in Groups of patients remained, after 7 years the frequency of clicking in the TMJ was in group 1 - 73.9% (161 cases), in group 2 the value of this indicator was statistically significantly lower ($p<0, 05$) - 43.1% (84 cases), and in group 3 - significantly less than in Groups 1 and 2.

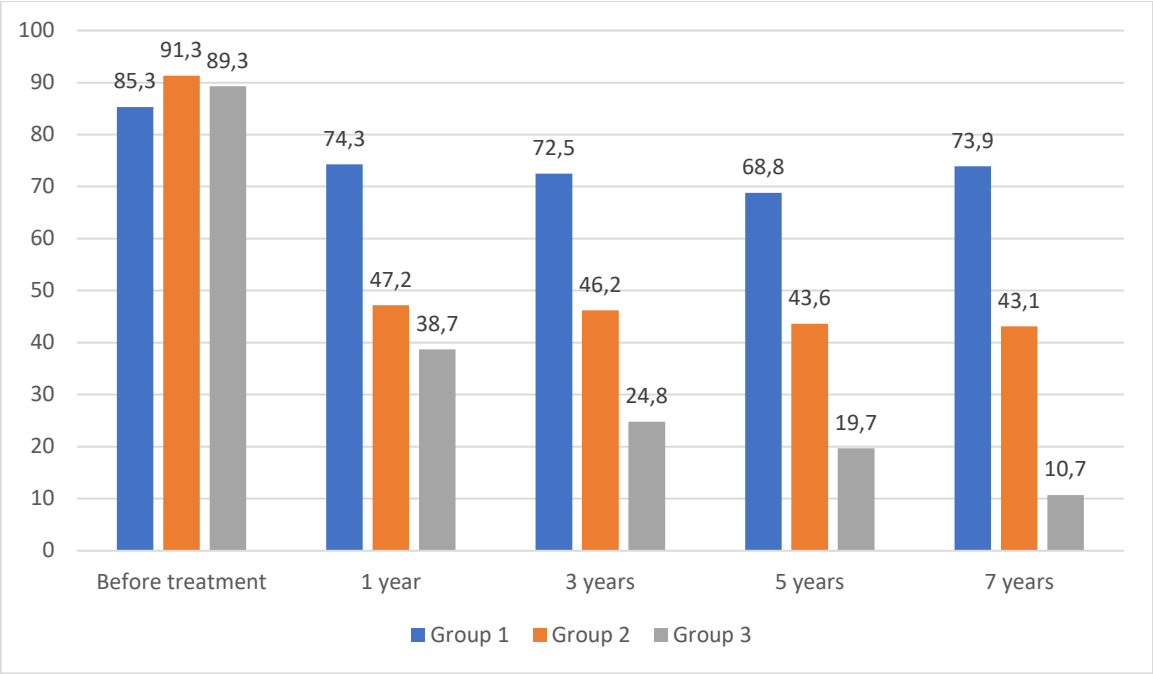


Figure 3.33 Dynamics of the presence of a click in the TMJ

The frequency of headache complaints before the start of treatment in group 1,128 (58.7%) cases, in group 2 this symptom was noted by 106 patients (54.4%), in group 3 - in 136 patients (58.1%) (Figure 3.14).

After 1 year, the value of this indicator decreased in all Groups, however, in group 1, the dynamics of this indicator was less expressed ($p<0.05$) than in Groups 2 and 3, its values were in group 1 - 92 (42.2%) case, in group 2, headache was observed in 20 patients (10.3%), in group 3 - in 13 patients (5.6%).

After 3, 5 and 7 years, the revealed ratios remained at the same level.

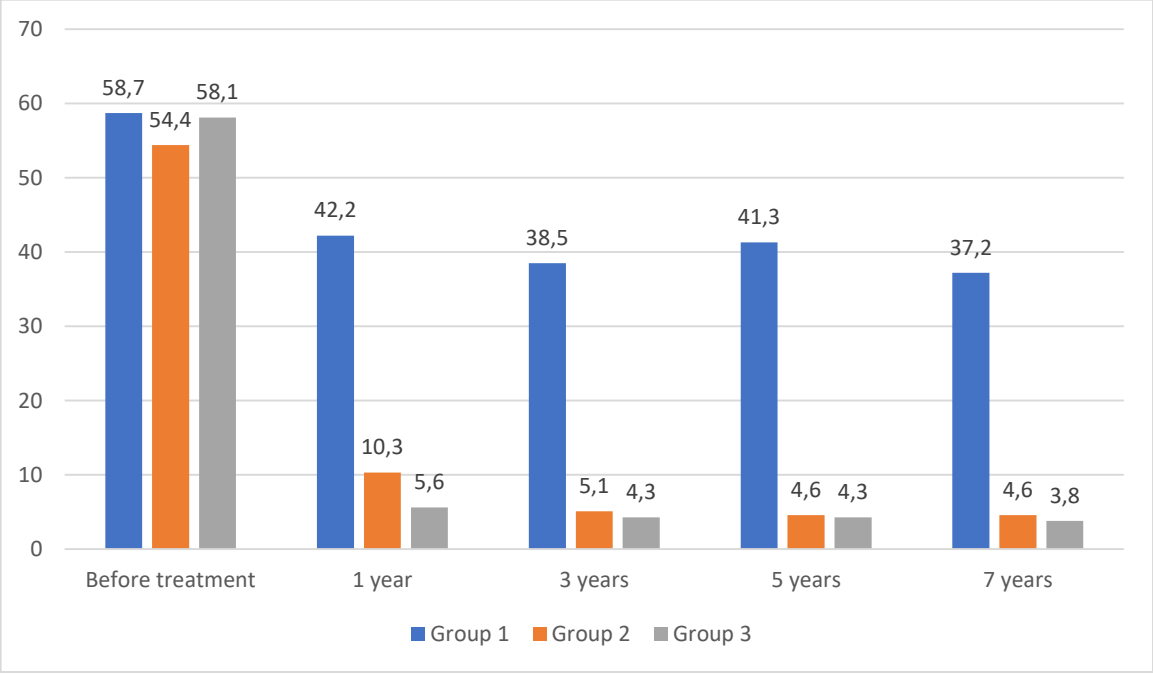


Figure 3.34 Dynamics of the presence of headache

An assessment of the presence of pain during chewing showed that before treatment, its manifestations were detected in group 1 - in 182 (83.5%) patients, in group 2 - in 170 patients (87.2%), in group 3 - in 208 patients (88.9%). After 1 year, there was an expressed decrease in the values of this indicator, the value of which was in group 2 - in 10.3%, in group 3 - 8.6% (Figure 3.35). The frequency of this symptom in both Groups was statistically significantly lower than in group 1 ($p<0.05$).

After 3 years, the revealed ratios were maintained, the same trend was observed 5 years after the treatment.

After 7 years, pain during chewing persisted in 148 (67.9%) patients of the first group, while in Groups 2 and 3 it was noted statistically significantly less frequently ($p<0.05$), respectively, in 12 (6.2%) and 16 patients (6.8%).

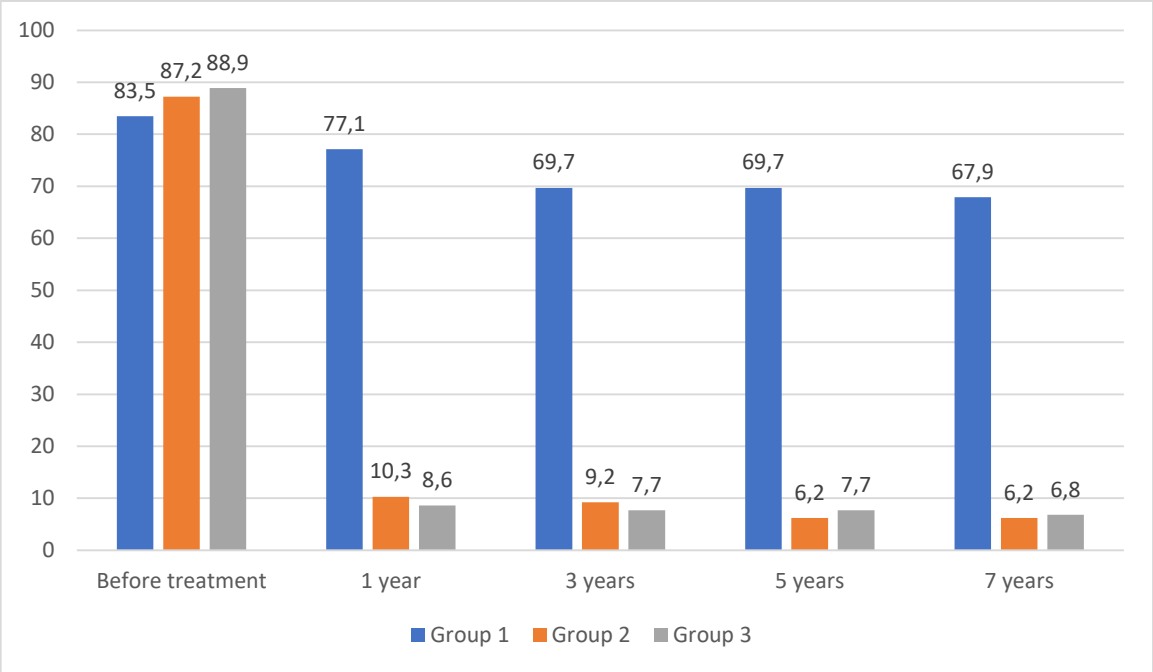


Figure 3.35 Dynamics of the presence of pain during chewing

An assessment of the presence of pain when opening the mouth showed that more than half of the patients included in the study had noted before treatment - from 54.1-61.5%. After 1 year, the frequency of manifestations of this symptom decreased for the patients of all groups. As can be seen from Figure 3.36, in group 1 - in 98 (45.0%) patients, in group 2 - in 20 patients (10.3%), in group 3 - in 17 patients (7.3%). The values of the indicators in the last two Groups were statistically significantly lower ($p<0.05$) than in group 1.

In the future, no expressed dynamics of this indicator was noted - after 3, 5 and 7 years from the start of observation, pain syndrome was observed much less frequently in Groups 2 and 3 ($p<0.05$) compared with the corresponding value in the first group

of patients.

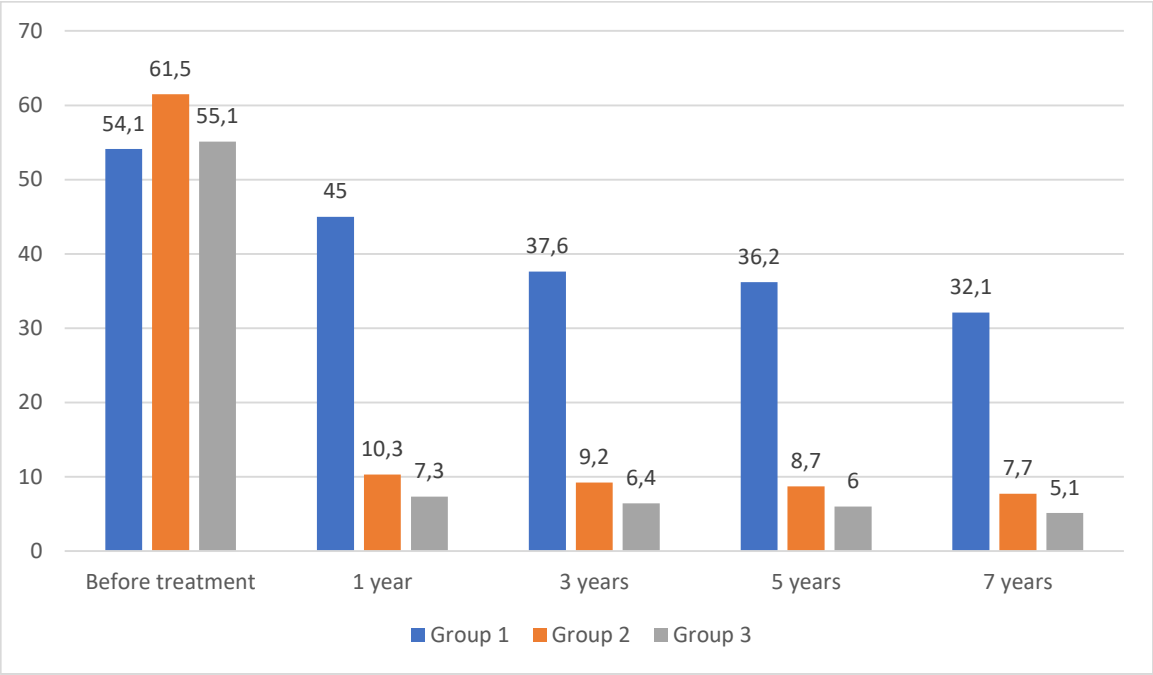


Figure 3.36 Dynamics of the presence of pain when opening the mouth

An assessment of the frequency of manifestation of pain and spasms in the neck showed that before the start of treatment, these signs were observed in the absolute majority in all Groups of patients. So, in group 1 - in 180 (82.6%) patients, in group 2 - in 167 patients (85.6%), in group 3 - in 194 patients (82.95) (Figure 3.37).

After 1 year, the value of this indicator significantly decreased for the patients of groups 2 and 3 - 16.4% and 15.0%, respectively, which was significantly lower ($p<0.05$) than in group 1 - 77.5%.

After 3 years, the identified trend continued, while only 20 patients (8.6%) reported pain and spasms in the neck, the level of this indicator was statistically significantly lower ($p<0.05$) than those in Groups 1 and 2 during this observation period. Subsequently, the revealed ratios of this trait in Groups of patients persisted both after 3 and 5, and after 7 years.

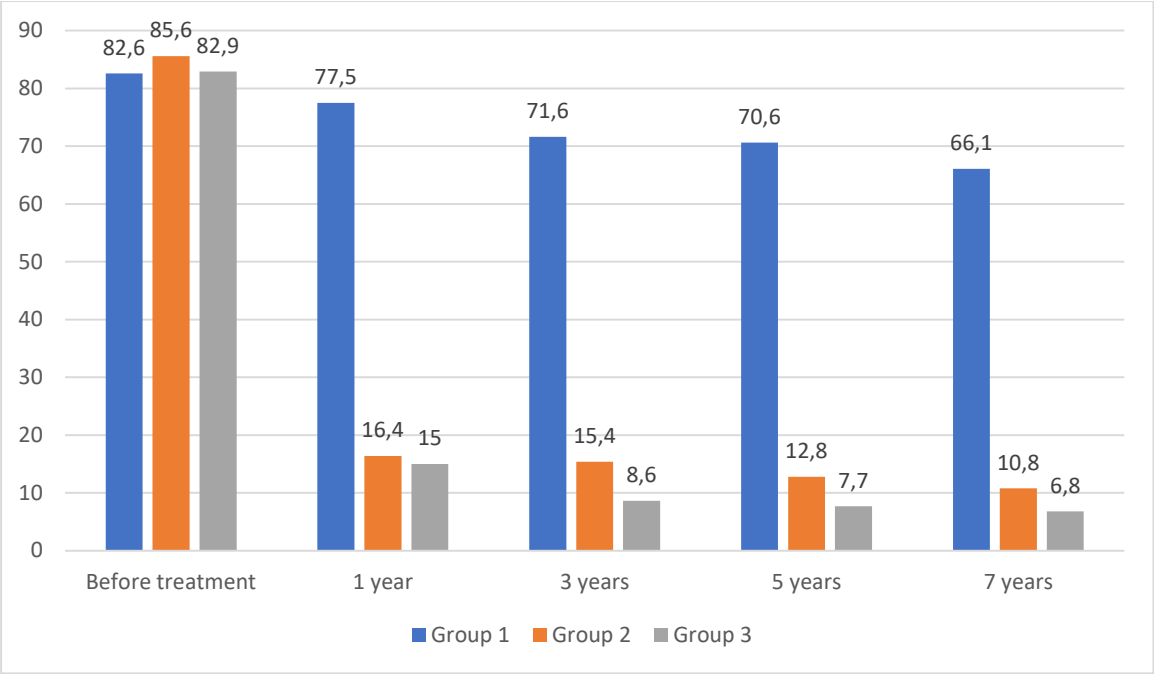


Figure 3.37 Dynamics of the presence of pain and spasms in the neck

* * *

The results of the conducted studies indicate that the use of the proposed complex of therapeutic and rehabilitation measures contributes to the fact that for the patients who undergo a complete reconstruction of the dentition in accordance with the interdisciplinary approach proposed by us, Deterioration or the absence of the treatment effect in relation to the soreness of the jaw muscles is statistically significantly less likely. facial area, pain in the TMJ is less common, when chewing, opening and closing the mouth, significantly lower (relative to the comparison group) levels of indicators of the visual analog scale for assessing pain.

Thus, the data obtained confirmed that within the framework of a set of measures for the correction and restoration of the anatomical shape of the teeth, one of the key areas should be the relief of pain and the correction of the pathology of the TMJ, accompanied by impaired joint function. The most important stage in the implementation of our proposed approach is a complete and consistent examination of patients in need of a total restoration of the dentition. In the course of solving the problems that specialists face when planning a complex of necessary medical and rehabilitation measures, it is necessary first of all to evaluate the manifestations of myofacial pain, which requires palpation of all muscle groups of the maxillofacial area during the examination. At the same time, efforts should be made to identify causal relationships of pain in these areas with occlusion disorders and TMJ pathology.

CHAPTER 4. RESULTS OF INSTRUMENTAL INVESTIGATIONS

4.1 Evaluation of the state of the temporomandibular joint according to the data of the occlusiogram

The study of the state of occlusion, performed on the basis of the results of the occlusiogram, showed the following relationships. Interference in ICP was detected in group 1 in 23 (10.6%) cases, in group 2 - in 8 patients (4.1%), in group 3 - in 3 patients (3.8%) (Figure 4.1). There were no statistically significant differences between the above indicators. Potrusion interferences were found in group 1 - in 118 (54.1%) patients, in Groups 2 and 3 - statistically significantly less frequently ($p<0.05$) than in group 1, respectively - in 28 (14.4%) and 22 patients (9.4%).

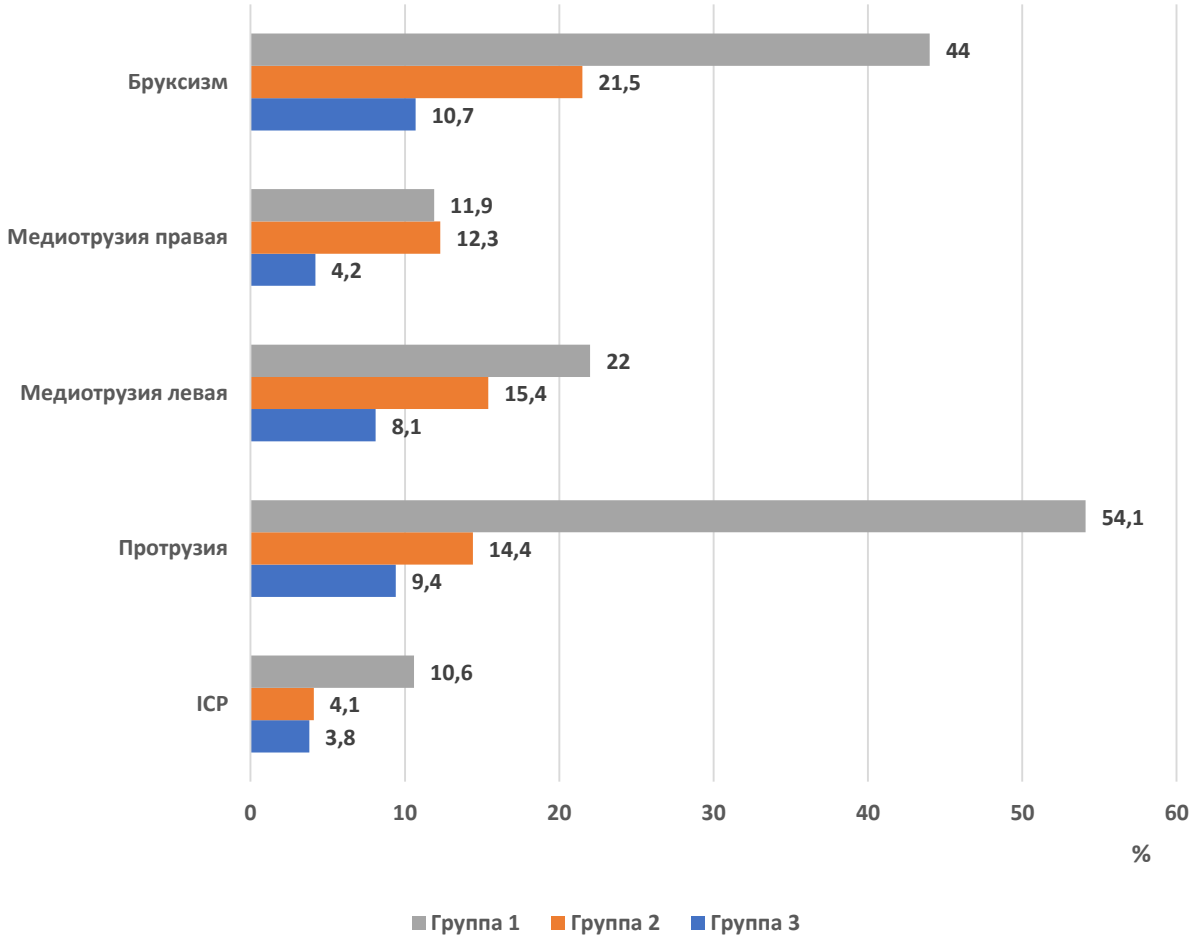


Figure 4.1 Dynamics of occlusiogram interference indicators after treatment

Interferences of the left mediotrusion were observed in group 1 - in 48 (22.0%) patients, in group 2 - in 30 cases (15.4%), in group 3 - in 19 patients (8.1%). Interferences in the right mediotrusion were observed in group 1 - in 26 (11.9%) patients, in group 2 - in 24 patients (12.3%), in group 3 - in 10 cases (4.2%). There were no statistically significant differences between the above indicators.

Interference in bruxism was detected in group 1 - in 96 (44.0%) patients, in group 2 - 2 times less often ($p<0.05$) - in 42 patients (21.5%), in group 3 - in 25 patients (10.7%), also significantly less frequently than in group 1.

Examination of patients in subsequent years showed that the identified ratios generally persisted. At the same time, in Groups 2 and 3, there was a decrease in the frequency of detecting interference with protrusion, mediotrusion, both right and left, as well as bruxism (Table 4.1).

Table 4.1 The results of the assessment of the state of the TMJ

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
ICP	23	10,6	8	4,1	9	3,8
Protrusion	118	54,1	28	14,4*	22	9,4*
Mediotrusion left	48	22,0	30	15,4	19	8,1
Mediotusion right	26	11,9	24	12,3	10	4,2
Bruxism	96	44,0	42	21,5*	25	10,7*
One year after						
ICP	22	10,1	6	3,1	7	3,0
Protrusion	110	50,5	19	9,7*	16	6,8*
Mediotrusion left	45	20,6	21	10,7	15	6,4
Mediotusion right	23	10,6	20	10,3	6	2,6*
Bruxism	88	40,4	39	20,0*	23	9,8*
Three years after						
ICP	20	9,2	6	3,1	6	2,6
Protrusion	109	50,0	17	8,7*	5	2,1*
Mediotrusion left	44	20,2	20	10,3	13	5,6
Mediotusion right	20	9,2	18	9,2	6	2,6
Bruxism	83	38,1	33	16,9	19	8,1*
Five years after						
ICP	18	8,3	4	2,1	3	1,3
Protrusion	98	45,0	6	3,1*	5	2,1*
Mediotrusion left	39	17,9	17	8,7	13	5,6
Mediotusion right	20	9,2	14	7,2	5	2,1
Bruxism	86	39,5	29	14,9	18	7,7*
Seven years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
ICP	19	8,7	5	2,6	3	1,3
Protrusion	100	45,9	5	2,6*	3	1,3*
Mediotrusion left	36	16,5	15	7,7	11	4,7
Mediotusion right	19	8,7	13	6,7	3	1,3
Bruxism	84	38,5	29	14,9	16	6,8*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

Assessment of the state of the TMJ according to the results of the occlusiogram after 7 years of observation showed the following relationships. ICP interferences were detected in group 1 in 19 (8.7%) cases, in group 2 - in 5 patients (2.6%), in group 3 - in 3 patients (1.3%) (Figure 4.2).

Interferences in the protrusion were noted in group 1 - in 100 (45.9%) patients, in group 2 - in 5 patients (2.6%), in group 3 - statistically significantly less frequently ($p<0.05$) than in group 1 - in 3 patients (1.3%).

Interferences in the left mediotrusion were noted in group 1 - in 36 (16.4%) patients, in group 2 - in 15 patients (7.7%), in group 3 - in 11 cases (4.7%). Interferences in the Right mediotrusion were noted in group 1 - in 19 (8.7%) patients, in group 2 - in 13 patients (6.7%), in group 3 - in 3 cases (1.3%). With regard to mediotrusion, there were no statistically significant intergroup differences in this period of the study, as in the previous ones.

Interferences in bruxism were detected in group 1 - in 84 (38.5%) patients, in group 2 - in 29 patients (14.9%), in group 3 - significantly less frequently ($p<0.05$) than in the group 1 - in 16 patients (6.8%).

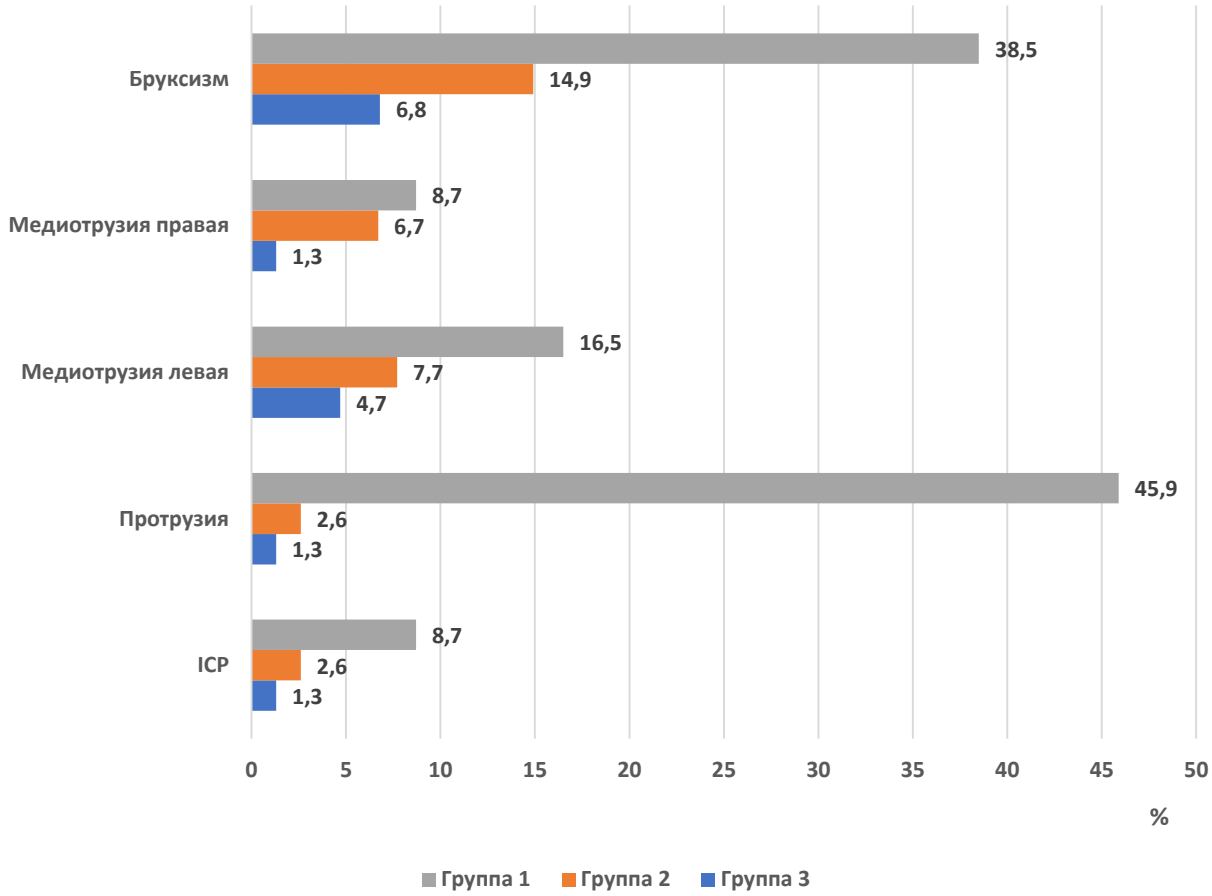


Figure 4.2 Indicators of interference in the occlusiogram 7 years after the treatment

4.2 Computed tomography results

An analysis of the characteristics of CTG after the treatment on such a basis as the presence of fluid and a change in the shape of the joint head showed that during this period of observation Improvement in group 1 was observed in 63 (28.9%) patients, in group 2 - statistically significantly more often ($p < 0.05$) - in 93 patients (47.7%). In the third group, the value of this indicator significantly ($p<0.05$) exceeded those in the first and second Groups and amounted to 66.6% (156 cases) (Figure 4.3).

No changes were noted in group 1 - in 103 (47.2%) patients, in group 2 - in 80 patients (41.0%). At the same time, in group 3, this value was 61 cases (26.1%) and was statistically significantly ($p<0.05$) less than in the first group.

Deterioration was observed in 52 (23.9%) patients of group 1, in group 2 - in 22 patients (11.3%). In the third group, the value of this indicator was statistically significantly lower ($p<0.05$) than in the first group, amounting to 7.3% (17 cases).

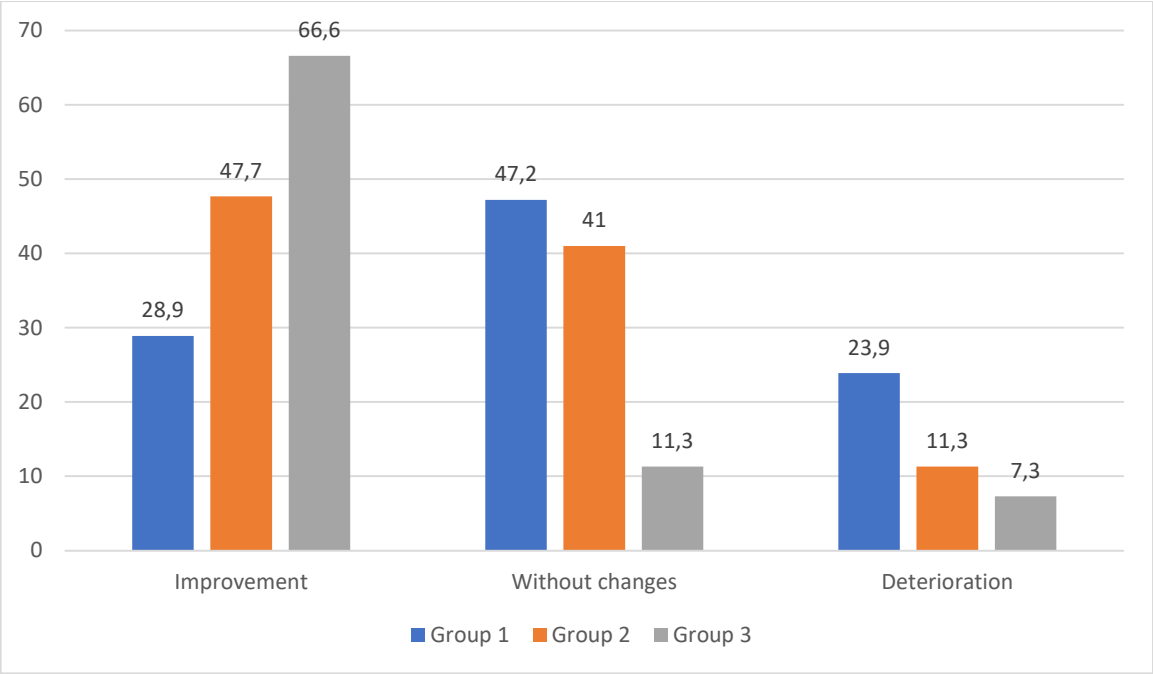


Figure 4.3 Dynamics of CTG characteristics after the treatment (presence of fluid and remodulation of the shape of the joint head)

The results of subsequent examinations of patients indicated that similar ratios of the frequencies of detecting the presence of fluid and changes in the shape of the joint head were observed in Groups of patients and in the future - after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in assessing these signs was statistically significantly higher ($p<0.05$) than in group 1 at all times of the examination (table 4.2, figure 4.4).

Table 4.2 The presence of fluid and changes in the shape of the head of the joint

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	63	28,9	93	47,7*	156	66,6*
Without changes	103	47,2	80	41,0	61	26,1*
Deterioration	52	23,9	22	11,3	17	7,3*
One year after						
Improvement	68	31,2	101	51,8*	164	70,1*
Without changes	106	48,6	74	37,9	55	23,5*
Deterioration	44	20,2	20	10,3	15	6,4

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Three years after						
Improvement	73	33,5	105	53,8*	171	73,1*
Without changes	100	45,9	78	40,0	52	22,2*
Deterioration	45	20,6	12	6,2	11	4,7*
Five years after						
Improvement	72	33,0	115	59,0*	172	73,5*
Without changes	107	49,1	69	35,4	52	22,2*
Deterioration	39	17,9	11	5,6	10	4,3*
Seven years after						
Improvement	75	34,4	117	60,0*	184	78,6*
Without changes	116	53,2	70	35,9*	40	17,1*
Deterioration	27	12,4	8	4,1	10	4,3*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

An assessment of the incidence of TMJ arthritis showed that after treatment, Improvement of this indicator in group 1 was observed in 45 (20.6%) patients, in group 2 - in 60 patients (30.7%), in group 3 - significantly more often than in the first group ($p<0.05$) - in 98 cases (41.9%) (Figure 4.5).

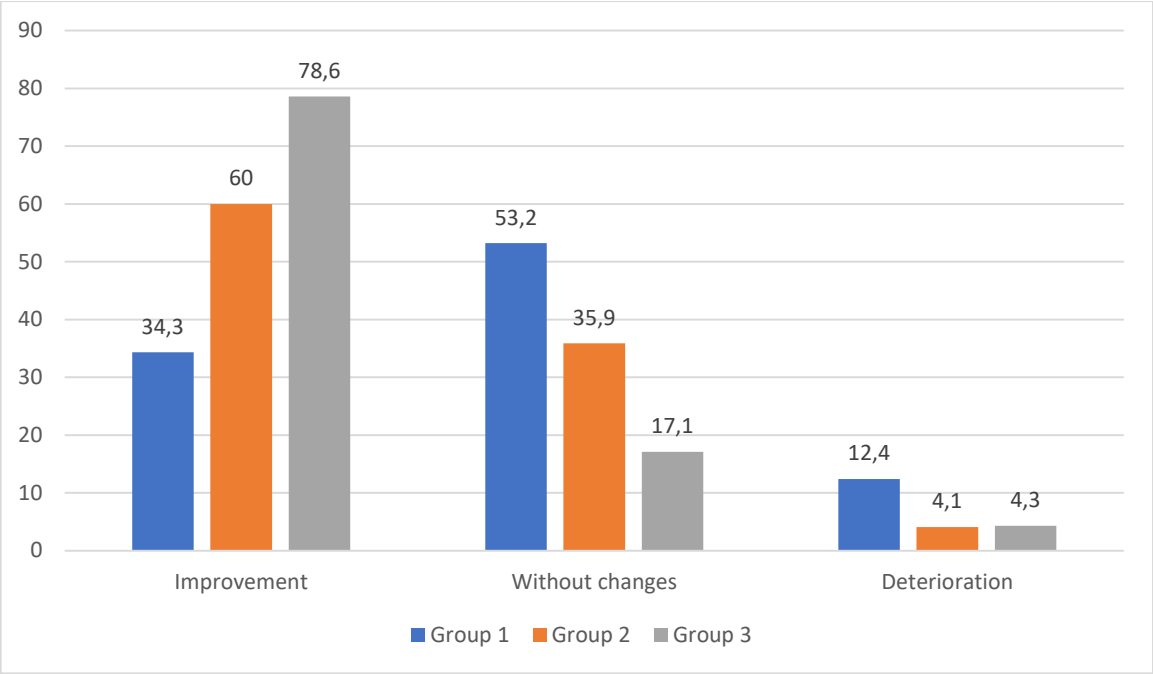


Figure 4.4 Characteristics of CTG 7 years after treatment (presence of fluid and change in the shape of the joint head)

There were no changes in 143 (65.6%) patients of the first group, in group 2 - in 114 patients (58.5%), in group 3 - in 119 patients (50.9%).

Deterioration was observed in group 1 - in 30 (13.8%) patients, in group 2 in 21 cases (10.8%), in group 3 - in 17 cases (7.2%). There were no statistically significant intergroup differences in the last two indicators.

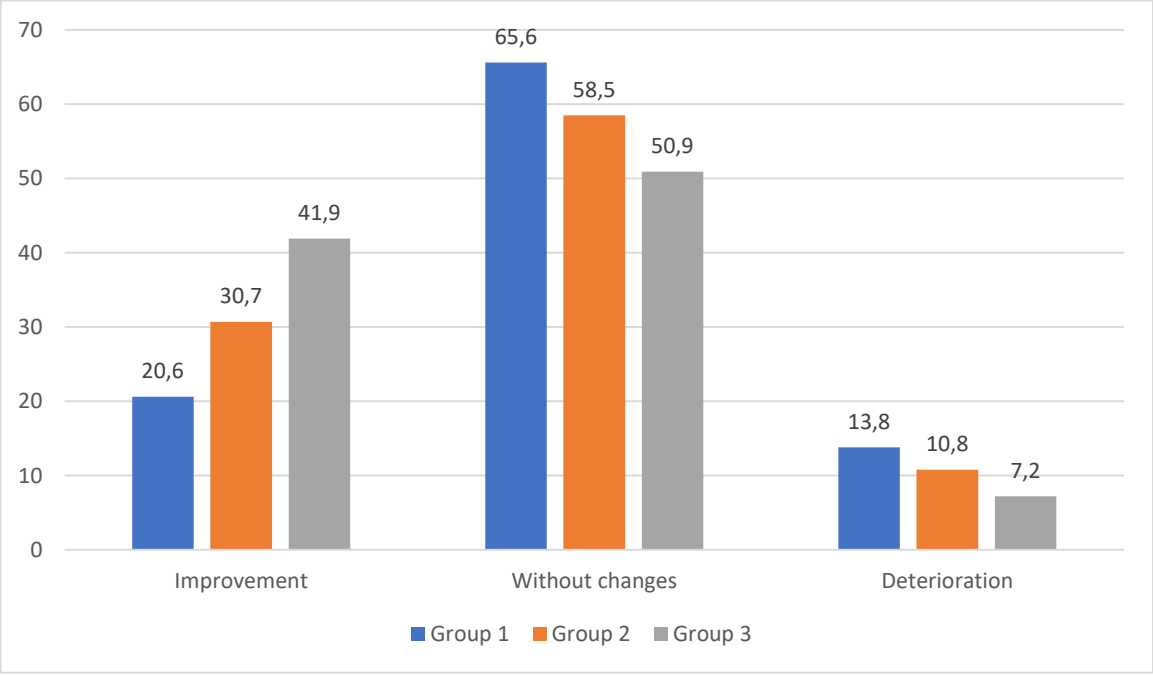


Figure 4.5 Dynamics of CTG characteristics after treatment (presence of TMJ arthritis)

Further observation showed that the revealed ratios of manifestations of TMJ arthritis in Groups of patients persisted up to 7 years. In Groups 2 and 3, the frequency of improvement for this trait was statistically significantly higher ($p<0.05$) than in group 1 at all times of patient examination (Table 4.3, Figure 4.6).

Table 4.3 Presence of TMJ arthritis

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	45	20,6	60	30,7	98	41,9*
Without changes	143	65,6	114	58,5	119	50,9
Deterioration	30	13,8	21	10,8	17	7,2
One year after						
Improvement	49	22,5	66	33,9	104	44,4*
Without changes	137	62,8	110	56,4	117	50,0
Deterioration	32	14,7	19	9,7	13	5,6
Three years after						
Improvement	56	25,7	71	36,4	120	51,3*
Without changes	135	61,9	109	55,9	104	44,4*
Deterioration	27	12,4	15	7,7	10	4,3
Five years after						
Improvement	54	24,8	78	40,0	119	50,9*
Without changes	134	61,5	100	51,3	106	45,3*
Deterioration	30	13,7	17	8,7	9	3,8*
Seven years after						
Improvement	57	26,1	86	44,1	130	55,6*
Without changes	138	63,3	98	50,3	95	40,6*
Deterioration	23	10,6	11	5,6	9	3,8

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

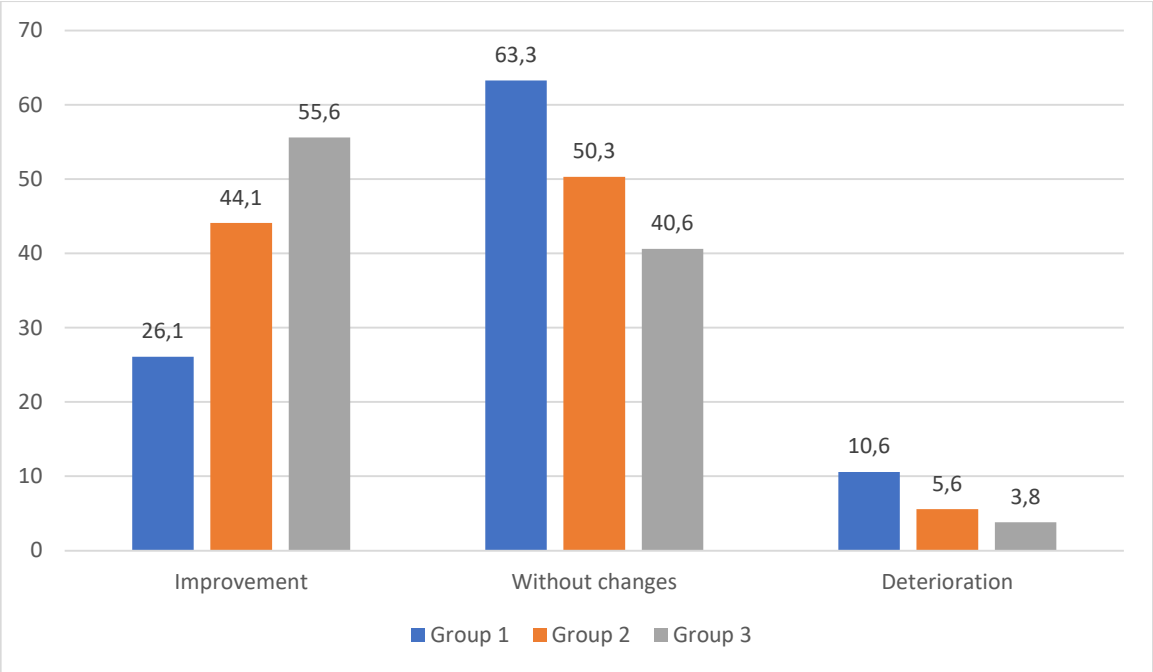


Figure 4.6 Characteristics of CTG 7 years after treatment (presence of TMJ arthritis)

The study of the frequency of occurrence of such a symptom as the presence of arthrosis of the TMJ showed that after treatment Improvement in group 1 was observed in 59 (27.1%) cases, in Groups 2 and 3 more often - in 74 (38.0%) and 116 patients (49.6%) (Figure 4.7).

No changes were noted in 130 (59.6%) patients of the first group, in 101 patients (51.8%) of the second group and 98 patients (41.9%) of the third group.

Deterioration of manifestations of this symptom, according to CTG, was observed in group 1 - in 29 (13.3%) patients, in group 2 - in 20 patients (10.2%), in group 3 - in 20 cases (8.5%). However, all the identified differences between the Groups in the frequency of detection of arthrosis of the TMJ did not reach statistical significance.

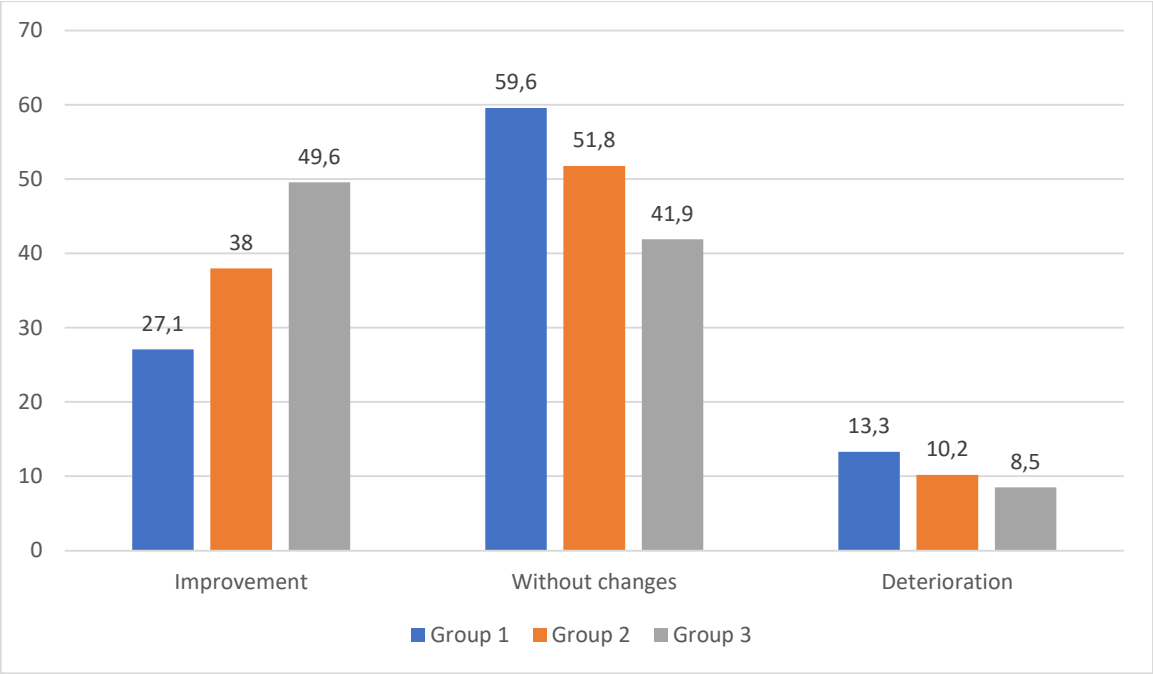


Figure 4.7 Dynamics of CTG characteristics after treatment (presence of arthrosis of the TMJ)

Subsequently, the noted levels and ratios of this manifestation of TMJ pathology (the presence of arthrosis of the joint) For the patients included in the study persisted after 1-7 years. In the second and third Groups of patients, the frequency of improvement in assessing the severity of arthrosis according to CTG data was statistically significantly higher ($p<0.05$) than in group 1 at all times of the patient examination (table 4.4, figure 4.8).

Table 4.4 The presence of arthrosis of the TMJ

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	59	27,1	74	38,0	116	49,6
Without changes	130	59,6	101	51,8	98	41,9
Deterioration	29	13,3	20	10,2	20	8,5
One year after						
Improvement	64	29,4	80	41,0	122	52,1*
Without changes	122	56,0	97	49,8	98	41,9
Deterioration	32	14,6	18	9,2	14	6,0
Three years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Improvement	61	28,0	83	42,6	132	56,4*
Without changes	130	59,6	94	48,2	88	37,6*
Deterioration	27	12,4	18	9,2	14	6,0
Five years after						
Improvement	70	32,1	91	46,7	132	56,4*
Without changes	122	56,0	90	46,2	87	37,2*
Deterioration	26	11,9	14	7,1	15	6,4
Seven years after						
Improvement	70	32,1	90	46,2	140	59,8*
Without changes	116	53,2	94	48,2	85	36,3*
Deterioration	32	14,7	11	5,6	9	3,9*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

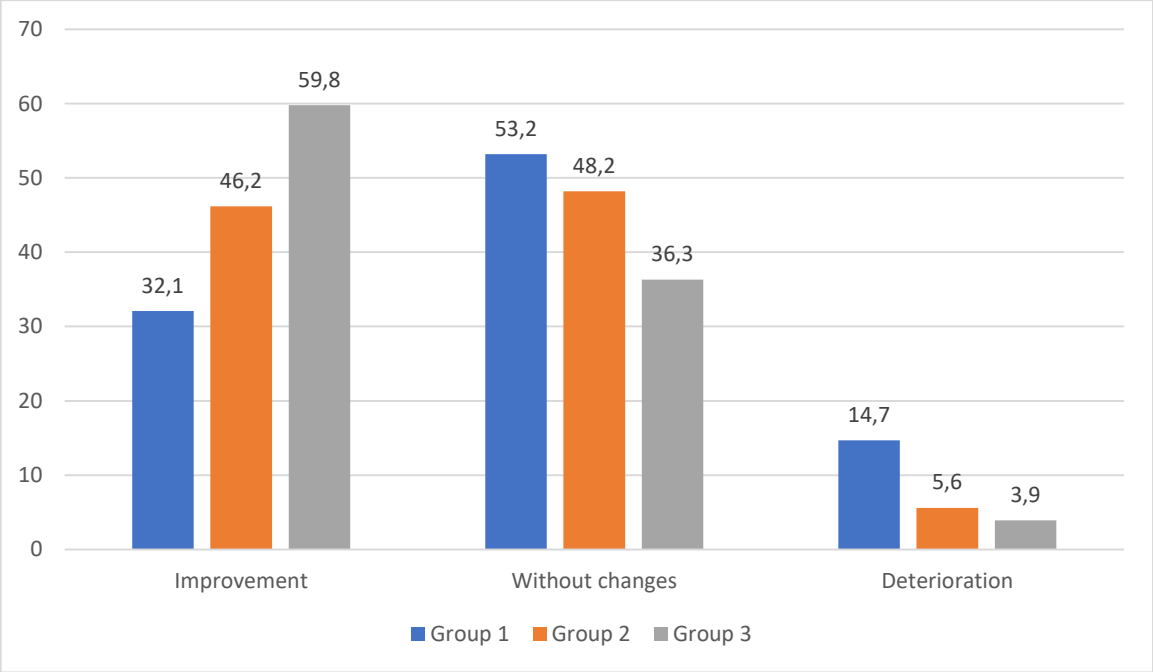


Figure 4.8 Characteristics of CTG 7 years after the treatment (presence of arthrosis of the TMJ)

An assessment of the frequency of detection of partial and complete reposition of the TMJ disc indicated that in group 1 Improvement after treatment was found in 35

(16.1%) cases, in Groups 2 and 3 more often - in 48 (24.6%) and 69 patients (29.5%) (Figure 4.9).

No changes were noted in group 1 - in 159 (72.9%) patients, in Groups 2 and 3, respectively, in 129 (66.2%) and 147 patients (62.8%).

Deterioration was recorded in 24 (11.0%) patients of the first group, in 18 cases (9.2%) in the second group and in 18 patients of the third group (7.7%). At the same time, all the identified differences between the Groups in the frequency of detection of partial and complete dislocation of the TMJ disc did not reach statistical significance.

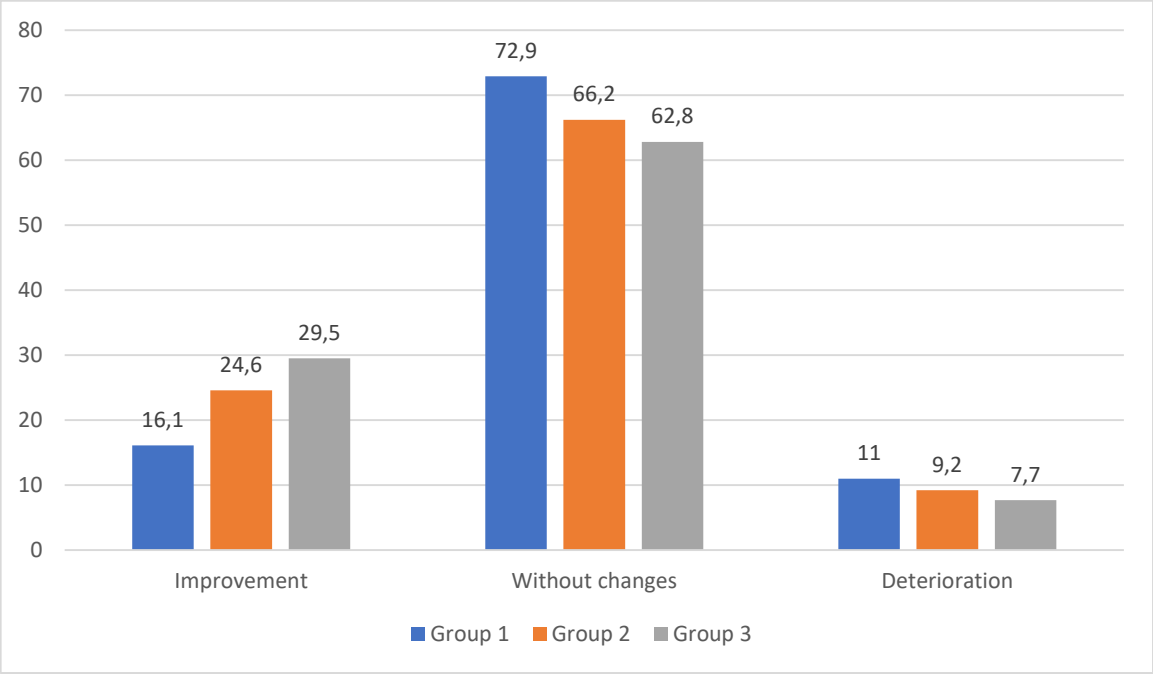


Figure 4.9 Dynamics of CTG characteristics after the treatment (presence of partial and complete dislocation of the TMJ disc)

Subsequent follow-up showed that the revealed ratios of manifestations of TMJ pathology on the basis of the presence of partial and complete disc dislocation in the TMJ in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in assessing this sign was slightly higher than in group 1 at all times of the examination of patients, although the differences found did not reach statistical significance (Table 4.5, Figure 4.10).

Table 4.5 Distal dislocation of the TMJ disc

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	35	16,1	48	24,6	69	29,5
Without changes	159	72,9	129	66,2	147	62,8
Deterioration	24	11,0	18	9,2	18	7,7
One year after						
Improvement	39	17,9	51	26,2	78	33,3
Without changes	157	72,0	128	65,6	142	60,7
Deterioration	22	10,1	16	8,2	14	6,0
Three years after						
Improvement	38	17,4	54	27,7	80	34,2
Without changes	161	73,9	125	64,1	140	59,8
Deterioration	19	8,7	16	8,2	14	6,0
Five years after						
Improvement	39	17,9	53	27,2	82	35,0
Without changes	164	75,2	131	67,2	142	60,7
Deterioration	15	6,9	11	5,6	10	4,3
Seven years after						
Improvement	37	17,0	56	28,7	84	35,9
Without changes	167	76,6	129	66,2	140	59,8
Deterioration	14	6,4	10	5,1	10	4,3

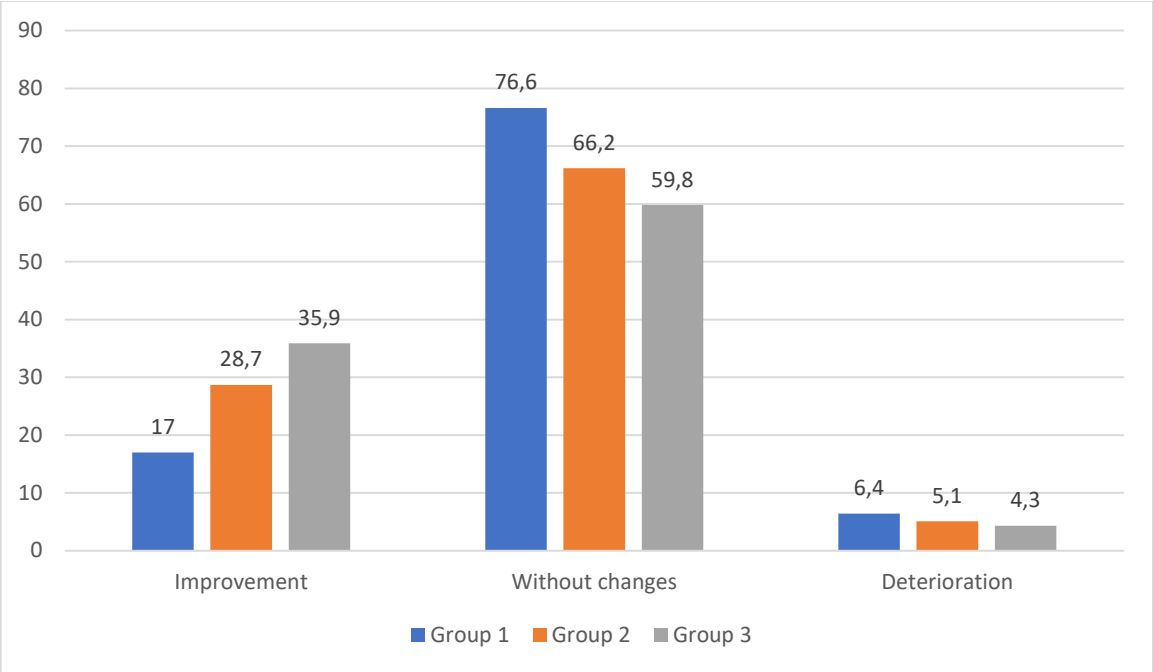


Figure 4.10 Characteristics of CTG 7 years after the treatment (presence of partial and complete distal dislocation of the TMJ)

An analysis of the frequency of detection of partial and complete dislocation of the TMJ showed that after treatment Improvement in group 1 was observed in 37 (17.0%) cases, in Groups 2 and 3 more often - in 45 (23.1%) and 70 patients (29. 9%) (Figure 4.11).

No changes were noted in group 1 - in 157 (72.0%) patients, in group 2 - in 132 cases (67.7%), in group 3 - in 146 patients (62.4%).

Deterioration according to this sign, detected during CTG, was observed in group 1 - in 24 (11.0%) patients, in Groups 2 and 3 there were 18 such cases each (9.2% and 7.7%, respectively). At the same time, all the identified differences between the Groups in the frequency of detection of partial and complete dislocation of the TMJ disc were statistically insignificant.

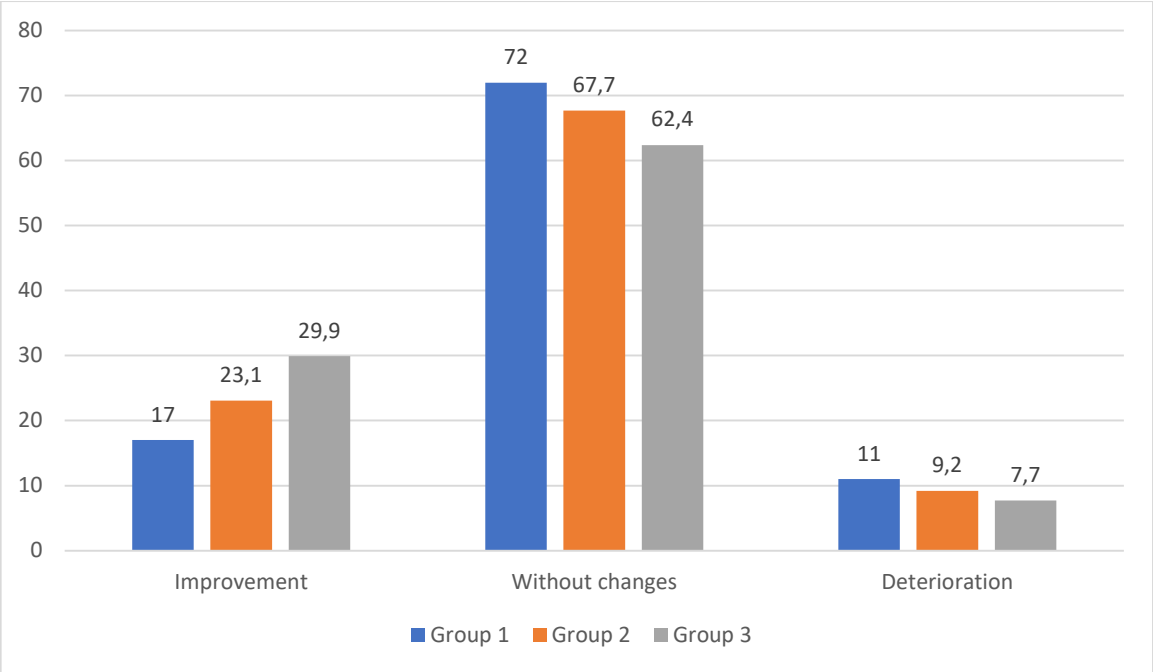


Figure 4.11 Dynamics of CTG characteristics after the treatment (presence of ventral dislocation of the TMJ)

Subsequently, the frequency of detection of ventral dislocation in the Groups of patients was largely similar to the ratios identified in the first period of the study and persisted up to 7 years. At the same time, For the patients of groups 2 and 3, the frequency of improvement in assessing this sign was slightly higher than in group 1 at all times of the examination of patients, although the differences found did not reach statistical significance (Table 4.6, Figure 4.12).

Table 4.6 Ventral dislocation of the TMJ disc

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	37	17,0	45	23,1	70	29,9
Without changes	157	72,0	132	67,7	146	62,4
Deterioration	24	11,0	18	9,2	18	7,7
One year after						
Improvement	42	19,3	48	24,6	78	33,3
Without changes	154	70,6	131	67,2	140	59,9
Deterioration	22	10,1	16	8,2	16	6,8
Three years after						

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Improvement	38	17,4	54	27,7	82	35,0
Without changes	161	73,9	120	61,5	138	59,0
Deterioration	19	8,7	21	10,8	14	6,0
Five years after						
Improvement	36	16,5	56	28,7	85	36,3
Without changes	166	76,2	128	65,6	139	59,4
Deterioration	16	7,3	11	5,7	10	4,3
Seven years after						
Improvement	37	17,0	59	30,3	88	37,6
Without changes	165	75,7	126	64,6	136	58,1
Deterioration	16	7,3	10	5,1	10	4,3

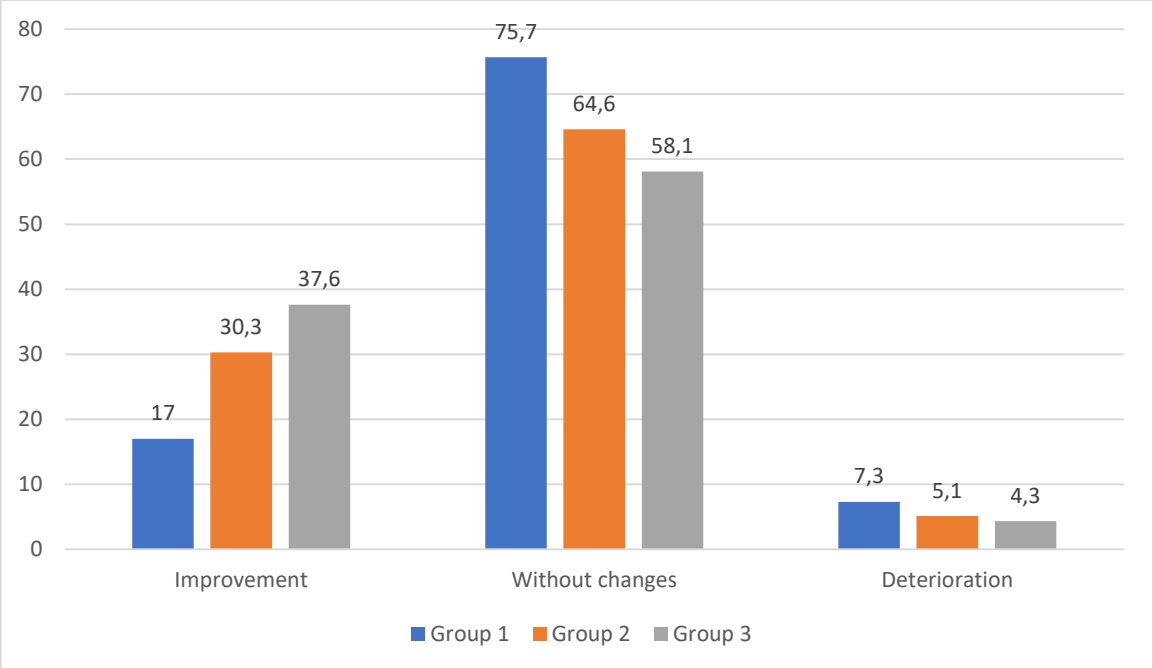


Figure 4.12 Characteristics of CTG 7 years after the treatment (presence of partial and complete dislocation of the TMJ disc)

4.3 Results of condylography

Evaluation of the results of condylography made it possible to establish that after the treatment in group 1 Improvement was observed in 25 (11.5%) cases, in group 2 - statistically significantly more often ($p<0.05$) - in 105 patients (53.8%). The value of this indicator in the third group 3 significantly exceeded ($p<0.05$) those in Groups 1 and 2, amounting to 71.8% (168 cases) (Figure 4.13).

No changes were observed in group 1 - in 148 (67.9%) patients, in Groups 2 and 3 statistically significantly less frequently ($p<0.05$), in 75 (38.5%) and 50 patients (21.4%), respectively. %).

Deterioration was observed in group 1 - in 45 (20.6%) patients, in group 2 - in 15 patients (7.7%), in group 3 - in 16 cases (6.8%). There were no statistically significant intergroup differences in this indicator.

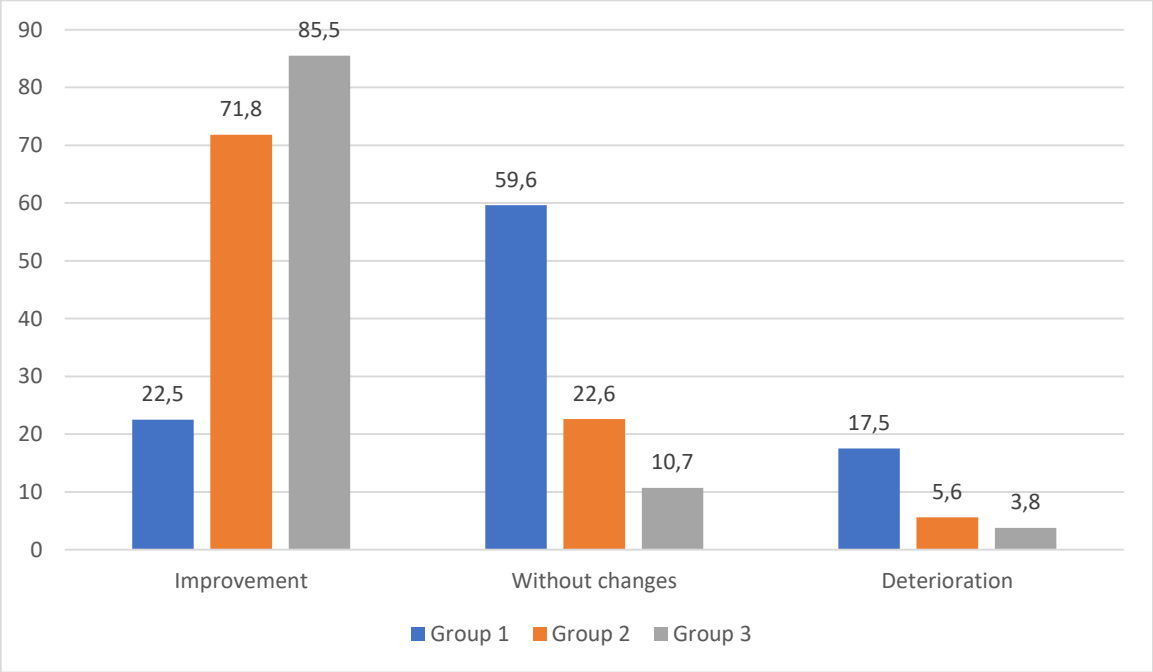


Figure 4.13 Dynamics of the characteristics of condylography after the treatment

Subsequently, the revealed ratios of the results of condylography persisted throughout the entire observation period. In Groups 2 and 3, the rate of improvement according to examination data obtained using this method was statistically significantly higher ($p<0.05$) than in Group 1 at all times of the patient examination (Table 4.7, Figure 4.14).

Table 4.7 General assessment of the results of condylography

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	25	11,5	105	53,8*	168	71,8*#
Without changes	148	67,9	75	38,5*	50	21,4*#
Deterioration	45	20,6	15	7,7	16	6,8
One year after						
Improvement	30	13,8	124	63,6*	190	81,2*#
Without changes	118	54,1	56	28,7*	26	11,1*#
Deterioration	70	32,1	15	7,7*	18	7,7*
Three years after						
Improvement	26	11,9	21	63,6*	180	76,9*
Without changes	122	56,0	59	30,3*	42	18,0*
Deterioration	70	32,1	12	6,1*	12	5,1*
Five years after						
Improvement	41	18,8	123	63,1*	180	76,9*
Without changes	88	40,4	64	32,8*	44	18,8*
Deterioration	89	40,8	8	4,1*	10	4,3*
Seven years after						
Improvement	54	24,7	124	63,6*	185	79,1*
Without changes	74	34,0	64	32,8*	41	17,5*
Deterioration	90	41,3	7	3,6*	8	3,4*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

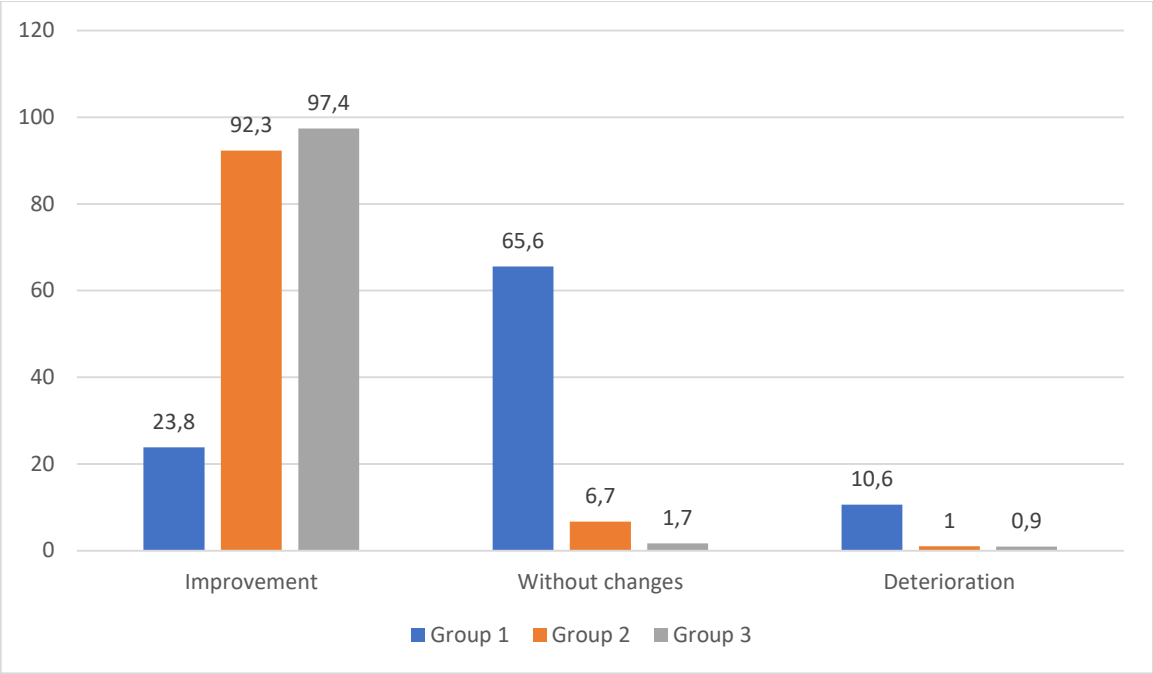


Figure 4.14 Dynamics of condylography characteristics 7 years after the treatment

4.4 Retrusion stability analysis

The study of the characteristics of retrusion stability after the treatment showed that, according to the severity of such an indicator as protrusion-retrusion, Improvement in group 1 was observed in 27 (12.4%) cases, in Groups 2 and 3 - statistically significantly more often ($p<0.05$), respectively, in 162 (83.1%) and 180 patients (77.0%) (Figure 4.15).

No changes were noted in group 1 - in 146 (67.0%) patients, in group 2 - statistically significantly less frequently ($p<0.05$) - in 17 patients (8.7%), in group 3 - in 42 patients (17.9%).

Deterioration was observed in 45 (20.6%) of the first group, in 16 cases in the second group (8.2%). The value of this indicator in the third group was minimal, statistically significantly lower ($p<0.05$) than in the first group - 12 cases (5.1%).

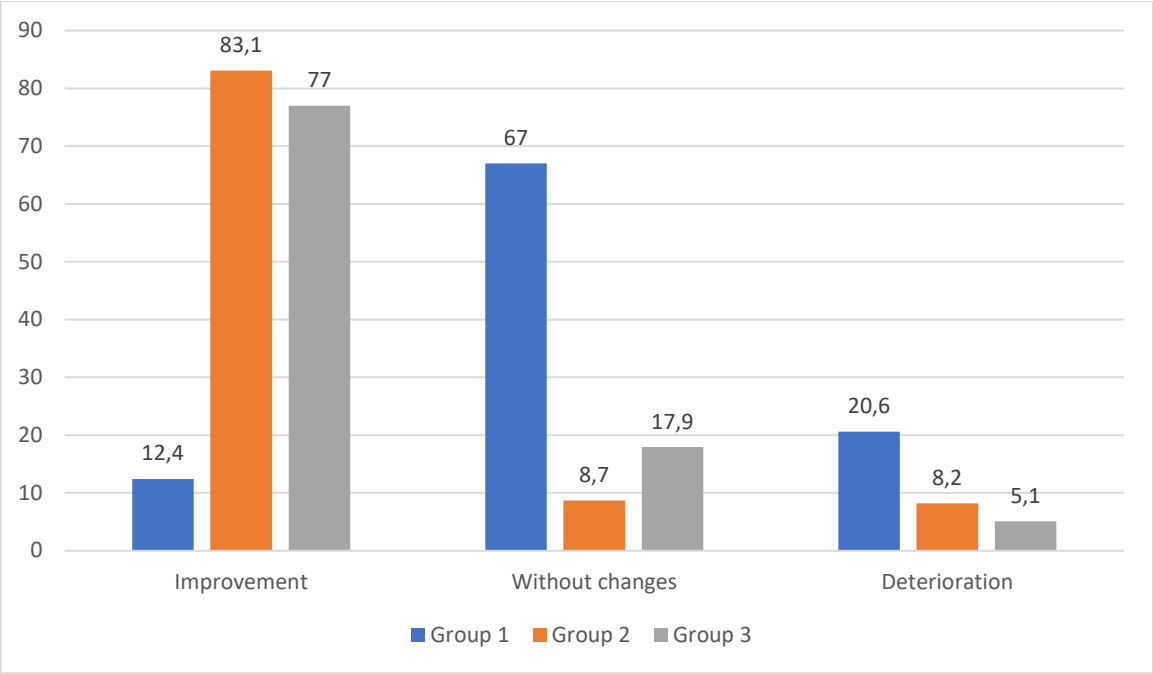


Figure 4.15 Dynamics of retrusion stability characteristics (protrusion-retrusion) after treatment

Further observation showed that the identified ratios of manifestations of TMJ pathology (protrusion-retrusion) in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in assessing this ratio according to CTG data was statistically significantly higher ($p<0.05$) than in group 1 at all times of the patient examination (table 4.8, figure 4.16).

Table 4.8 Protrusion-retrusion

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	27	12,4	162	83,1*	180	77,0*
Without changes	146	67,0	17	8,7*	42	17,9*
Deterioration	45	20,6	16	8,2	12	5,1*
One year after						

Improvement	33	15,1	160	82,1*	181	77,4*
Without changes	143	65,6	19	9,7*	39	16,7*
Deterioration	42	19,3	16	8,2	14	5,9
Three years after						
Improvement	26	11,9	157	80,5*	175	74,8*
Without changes	152	69,7	21	10,8*	48	20,5*
Deterioration	40	18,4	17	8,7	11	4,7
Five years after						
Improvement	39	17,9	150	76,9*	170	72,7*
Without changes	141	64,7	24	12,3*	49	20,9*
Deterioration	38	17,4	21	10,8	15	6,4
Seven years after						
Improvement	43	19,7	144	73,8*	170	72,7*
Without changes	145	66,5	36	18,5*	53	22,6*
Deterioration	30	13,8	15	7,7	11	4,7

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

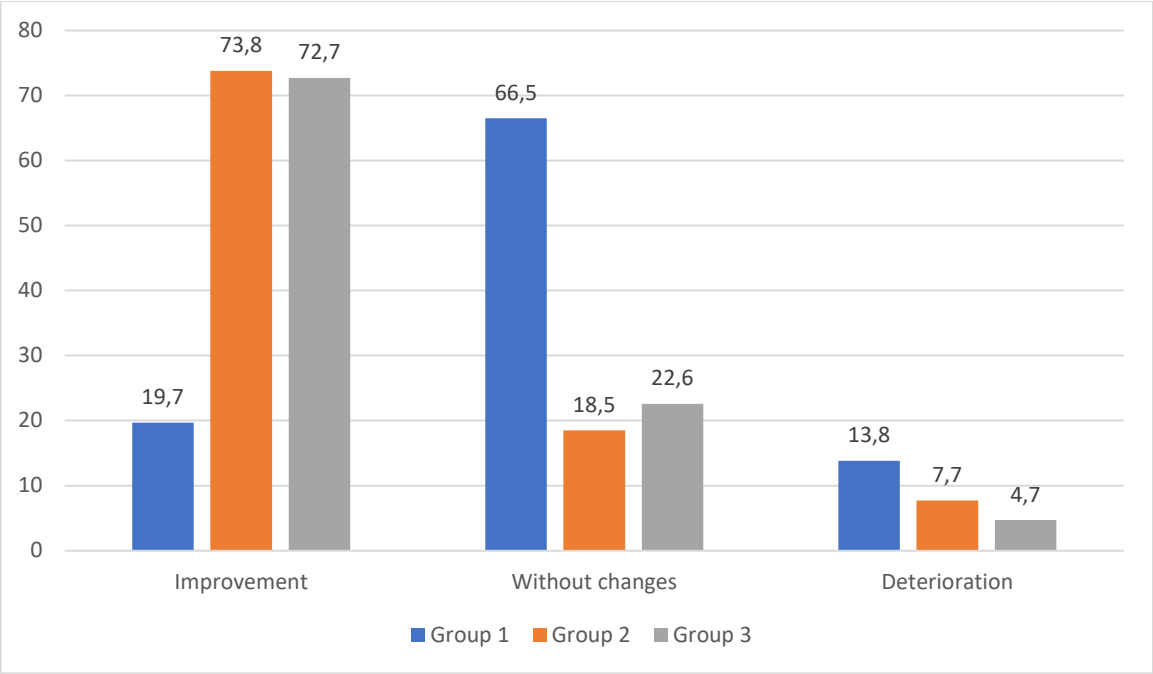


Figure 4.16 Indicators of retrusion stability (protrusion-retrusion) seven years after the treatment

Analysis of changes in the severity of right mediotrusion showed that Improvement in group 1 was observed in 23 (10.6%) cases, in group 2 - statistically significantly more often ($p<0.05$) - in 150 patients (76.9%), in group 3 also significantly more often than in the first group - in 180 patients (76.9%) (Figure 4.17).

No changes were observed most often in the first group - in 150 (68.8%) patients. In Groups 2 and 3, the value of this indicator was statistically significantly lower ($p<0.05$) than in Groups 2 and 3, amounting to 40 (20.5%) and 48 cases (20.5%), respectively.

Deterioration was observed in 45 (20.6%) patients of the first group, in Groups 2 and 3 significantly less frequently ($p<0.05$) - 5 (2.6%) and 6 cases (2.6%), respectively, were noted.

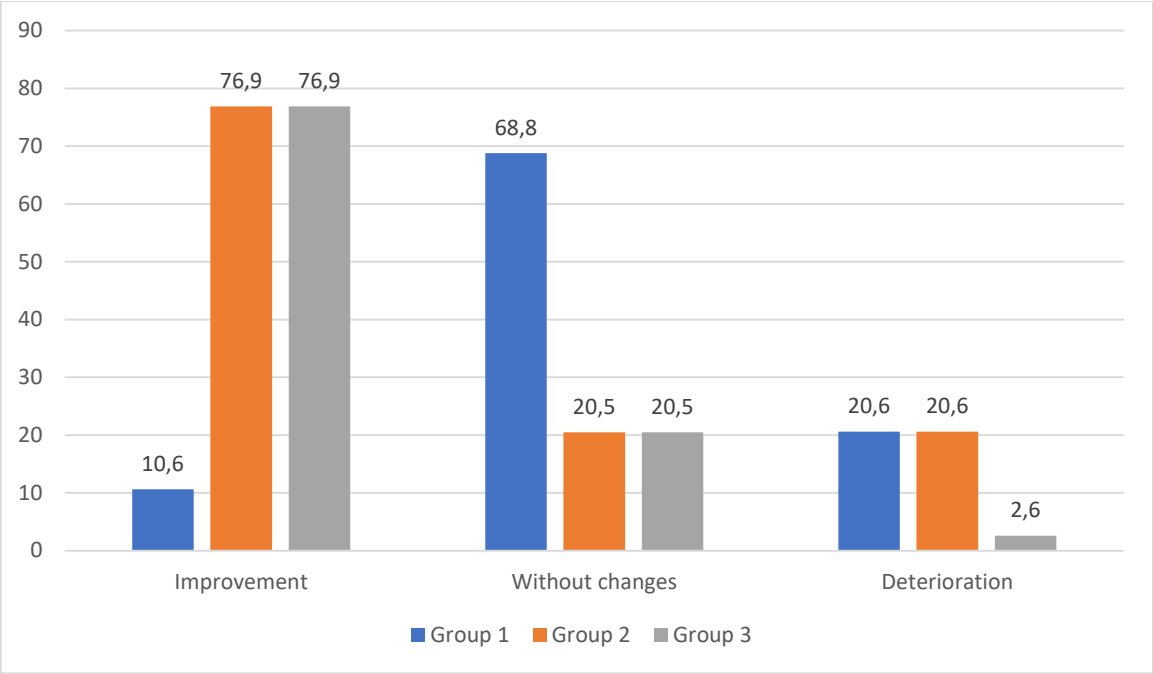


Figure 4.17 Dynamics of characteristics of right mediotrusion after treatment

Further observation showed that the revealed ratios of manifestations of TMJ pathology (right mediotrusion) in Groups of patients persisted after 1-7 years. For the patients of groups 2 and 3, the frequency of improvement in the condition of the joint when assessing the presence of this sign according to CTG data was statistically significantly higher ($p<0.05$) than in group 1, at all times of the examination of patients (table 4.9, figure 4.18).

Table 4.9 Right mediotrusion

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	23	10,6	150	76,9*	180	76,9*
Without changes	150	68,8	40	20,5*	48	20,5*
Deterioration	45	20,6	5	2,6	6	2,6*
One year after						
Improvement	31	14,2	150	76,9*	178	76,1*

Without changes	145	66,5	31	15,9*	38	16,2*
Deterioration	42	19,3	14	7,2	18	7,7
Three years after						
Improvement	28	12,8	148	75,9*	174	74,4*
Without changes	140	64,2	33	16,9*	42	18,0*
Deterioration	50	23,0	14	7,2	18	7,6
Five years after						
Improvement	37	17,0	144	73,8*	170	72,6*
Without changes	121	55,5	37	19,0*	44	18,8*
Deterioration	60	27,5	14	7,2	20	8,6
Seven years after						
Improvement	40	18,3	135	69,3*	174	74,4*
Without changes	148	67,9	40	20,5*	46	19,6*
Deterioration	30	13,8	20	10,2	14	6,0

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

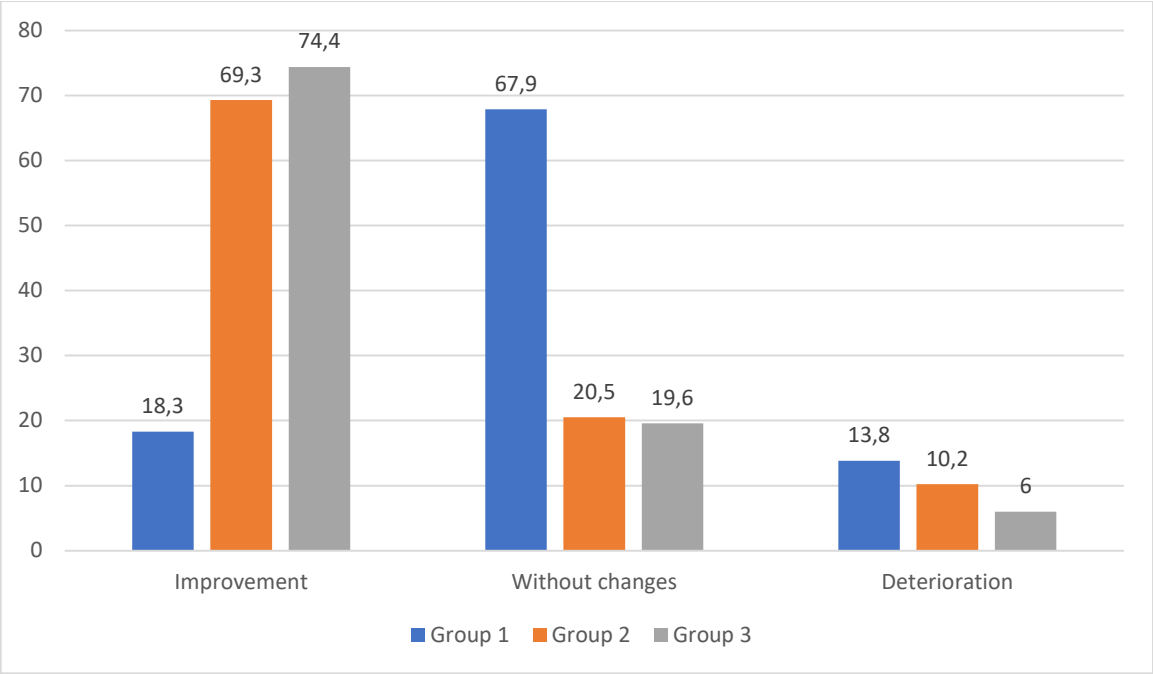


Figure 4.18 Indicators of mediotrusion of the right seven years after after the treatment

Analysis of changes in the characteristics of mediotrusion after the treatment showed that, according to the severity of such an indicator as left mediotrusion, Improvement in group 1 was observed only in 29 (13.3%) cases, in group 2 - statistically significantly more often ($p<0.05$) - in 152 patients (78.0%), in group 3 also significantly more often than in the first group - in 182 patients (77.8%) (Figure 4.19).

No changes were observed in group 1 in 148 (67.9%) patients, in the second group - statistically significantly less ($p<0.05$) - in 40 patients (20.5%), in group 3 - with a similar frequency - in 48 patients (20.5%).

Deterioration was observed in 41 (18.8%) cases in the first group, while in the second and third Groups only isolated cases of Deterioration were observed for this characteristic. The values of this indicator were in group 2 - 3 cases (1.5%), in group 3 - 4 cases (1.7%).

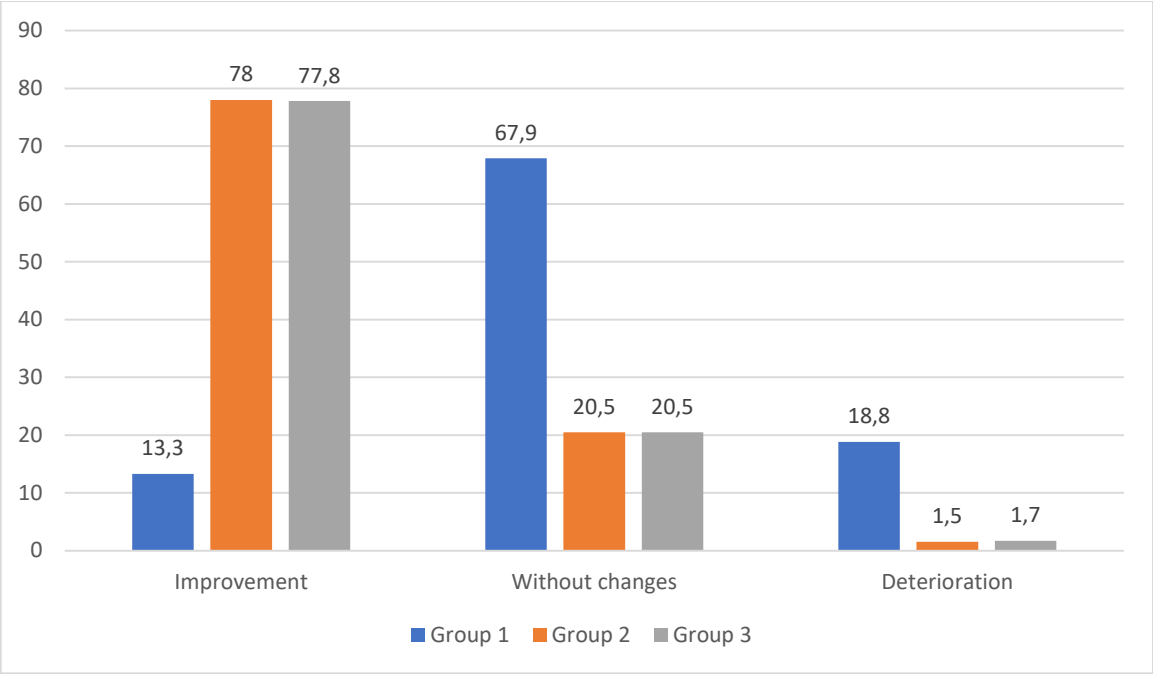


Figure 4.19 Dynamics of characteristics of left mediotrusion after treatment

Subsequently, it was found that the identified ratios of manifestations of such a sign as left mediotrusion in Groups of patients persisted for 1-7 years of follow-up. In Groups 2 and 3, the frequency of improvement in assessing the severity of this symptom according to CTG data was statistically significantly higher ($p<0.05$) than in group 1, at all times of the examination of patients (Table 4.10, Figure 4.20).

Table 4.10 Mediotrusion left

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment						
Improvement	29	13,3	152	78,0*	182	77,8*
Without changes	148	67,9	40	20,5*	48	20,5*
Deterioration	41	18,8	3	1,5	4	1,7
One year after						
Improvement	34	15,6	150	76,9*	182	77,8*

Without changes	146	67,0	39	20,0*	47	20,1*
Deterioration	38	17,4	6	3,1	5	2,1
Three years after						
Improvement	30	13,8	148	75,9*	180	76,9*
Without changes	152	69,7	32	16,4*	36	15,4*
Deterioration	36	16,5	15	7,7	18	7,7
Five years after						
Improvement	43	19,7	138	70,7*	178	76,1*
Without changes	141	64,6	43	22,1*	36	15,3*
Deterioration	34	16,5	14	7,2	20	8,6
Seven years after						
Improvement	47	21,6	138	70,8*	178	76,1*
Without changes	145	66,5	30	15,4*	38	16,2*
Deterioration	26	11,9	27	13,8	18	7,7

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

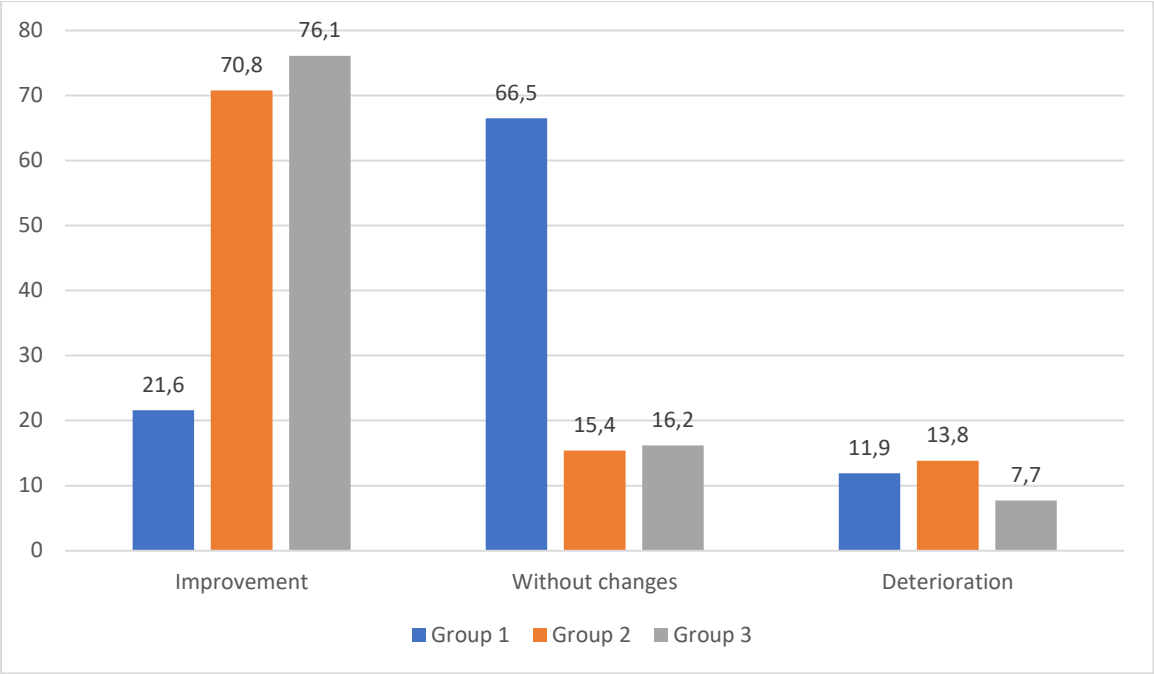


Figure 4.20 Indicators of mediotrusion of the left seven years after after the treatment

4.5 Dynamics of electromyographic parameters

Analysis of EMG parameters showed that before treatment, the resting amplitude of the masseter muscle was 18.2 ± 1.2 mV in group 1, 19.4 ± 1.5 mV in group 2, and 17.4 ± 1.8 mV in group 3 mV (Figure 4.21). At the same time, there were no significant intergroup differences in this indicator.

One year after the treatment, the resting amplitude of the masticatory muscle was 11.5±0.9 mV For the patients of the first group, while in the second group the value of this indicator was statistically significantly lower ($p<0.05$) - 7.3 ±0.6 mV. During this period, For the patients of the third group, the value of this parameter was significantly lower than the values in Groups 1 and 2, amounting to 5.7±0.9 mV.

After 3 years, the resting amplitude of the masticatory muscle decreased in all Groups of patients: in group 1 - to 9.6±0.7 mV, and in the second and third Groups, the value of this indicator was 6.8±0.4 and 4.8±, respectively. 0.3 mV and was statistically significantly lower ($p<0.05$) than in group 1.

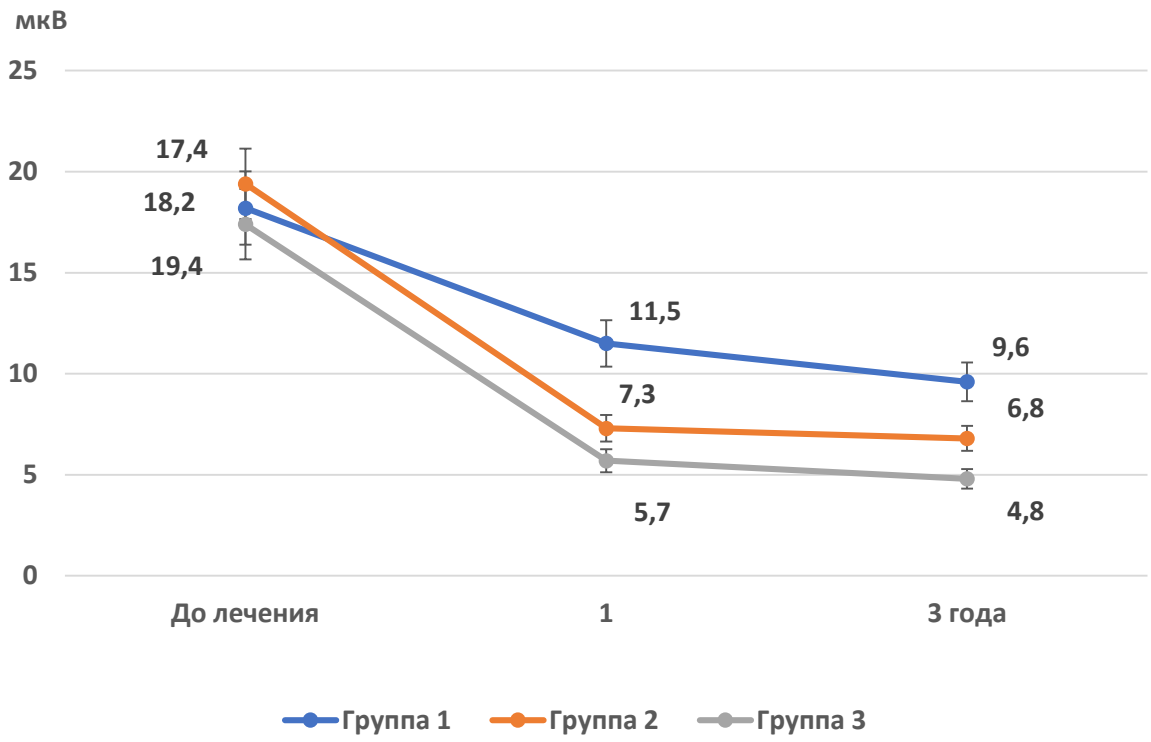


Figure 4.21 Dynamics of the resting amplitude of the masseter muscle

As can be seen from Figure 4.22, before treatment, the amplitude of compression of the masticatory muscle in Groups 1, 2 and 3, respectively, was 165.7 ± 25.0 mV, 158.6 ± 17.4 mV and 321.5 ± 16.7 mV, significant intergroup No differences were found in this indicator.

One year after the treatment, an increase in the level of this indicator was noted, its value was 195.3±31.8 mV in the first group, in group 2 it was significantly higher ($p<0.05$) - 282.2±20.1 mV. The maximum amplitude of compression of this muscle was for the patients of the third group - 321.5±16.7 mV, this value was statistically significantly higher than those in Groups 1 and 2.

Three years after the treatment, the magnitude of the compression amplitude

masticatory muscle increased in all Groups of patients, while the previously observed ratios were maintained, the levels of the indicator were in group 1 - 212.8 ± 19.4 mV, in Groups 2 and 3, respectively 311.6 ± 25.4 mV and 376.1 ±25.2 mV.

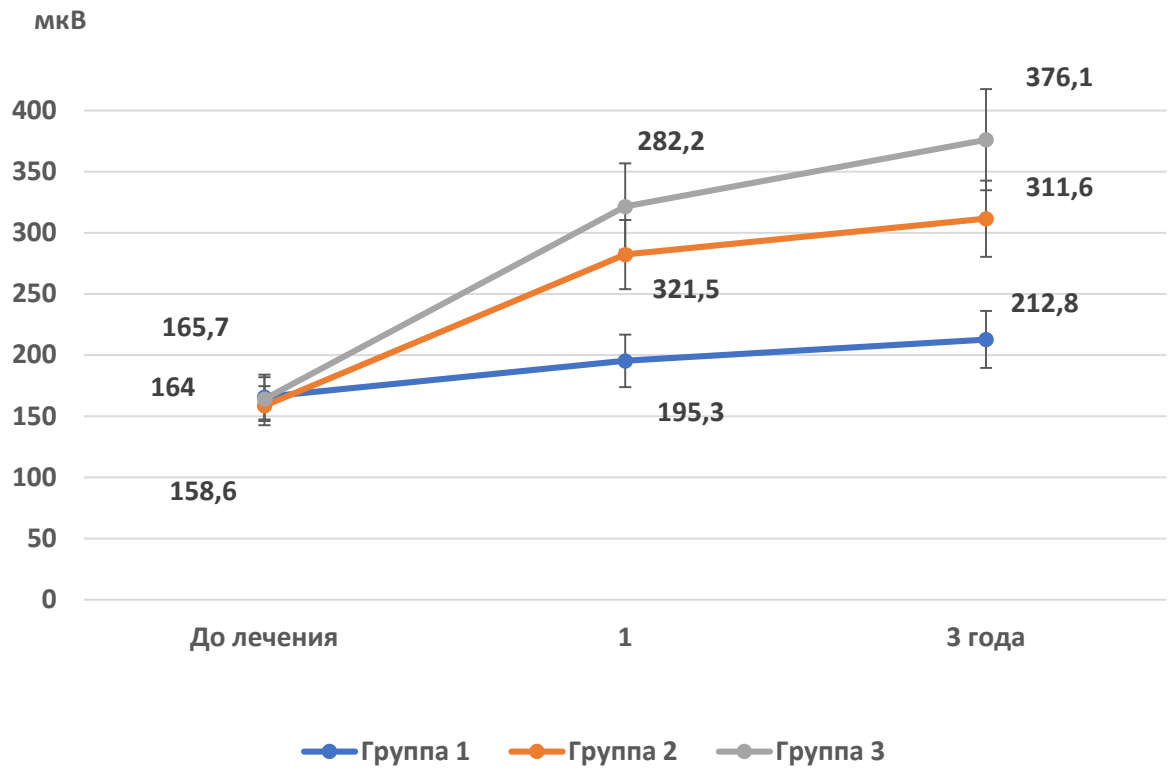


Figure 4.22 Dynamics of the amplitude of compression of the masseter muscle

The evaluation of the EMG characteristics of the temporal muscle indicated that in the initial period of observation, the resting amplitude of this muscle was 38.2 ± 2.1 mV in group 1, 39.4 ± 2.5 mV in group 2, and 37 mV in group 3. .6±3.8 mV (Figure 4.23). At the same time, there were no significant intergroup differences in this indicator.

One year after the treatment, the value of this parameter decreased to 32.6±1.4 mV For the patients of the first group, in group 2 it was significantly lower ($p<0.05$) - 29.5±1.6 mV. In the third group 3, the resting amplitude was 24.4±1.9 mV and was significantly lower ($p<0.05$) than those in the first two Groups.

Three years after the treatment, the identified trends persisted: the resting amplitude of the temporal muscle was 31.3 ± 2.5 mV in group 1, 27.3 ± 1.4 mV in group 2, and For the patients of the third group, the level of this indicator was 23.1±1.3 mV and was statistically significantly less ($p<0.05$) than the values in Groups 1 and 2.

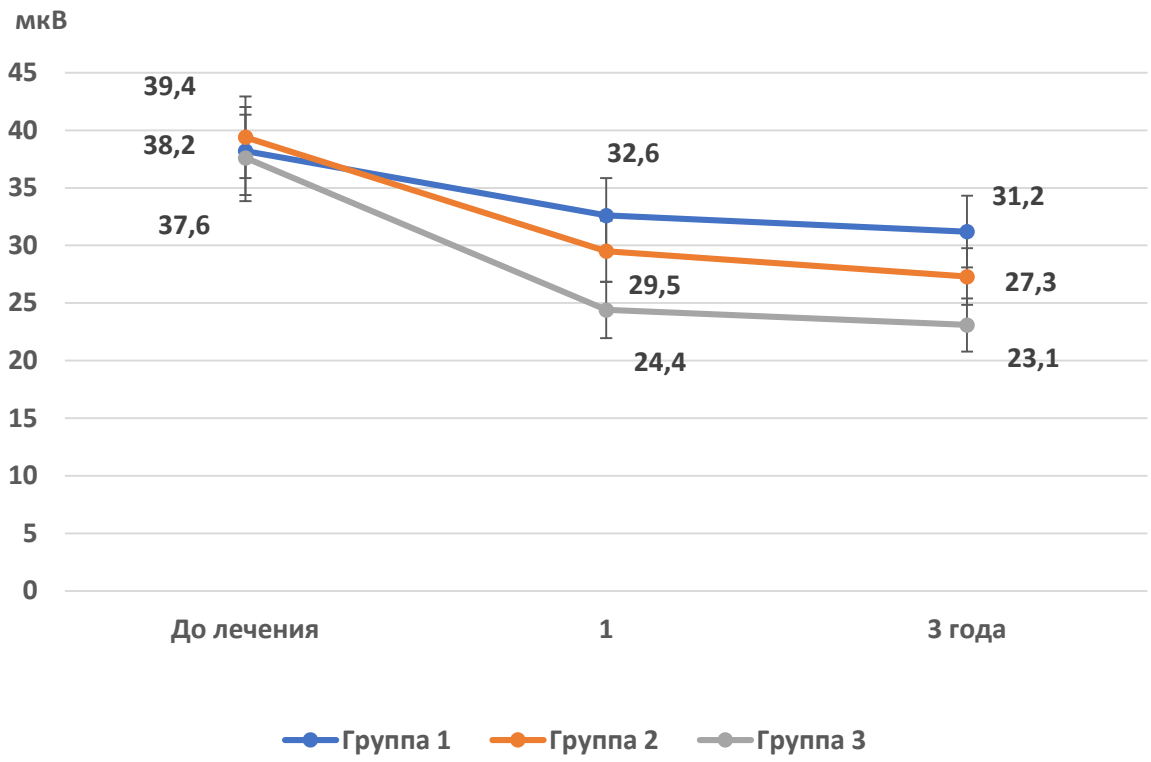


Figure 4.23 Dynamics of the resting amplitude of the temporal muscle

The study of the dynamics of the amplitude of compression of the temporal muscle showed that before treatment, the values of the indicators did not differ significantly and were at the following levels: in group 1 - 173.8±20.8 mV, in group 2 - 168.6±19.7 mV, in group 3 - 171.5 ± 21.2 mV (Figure 4.24).

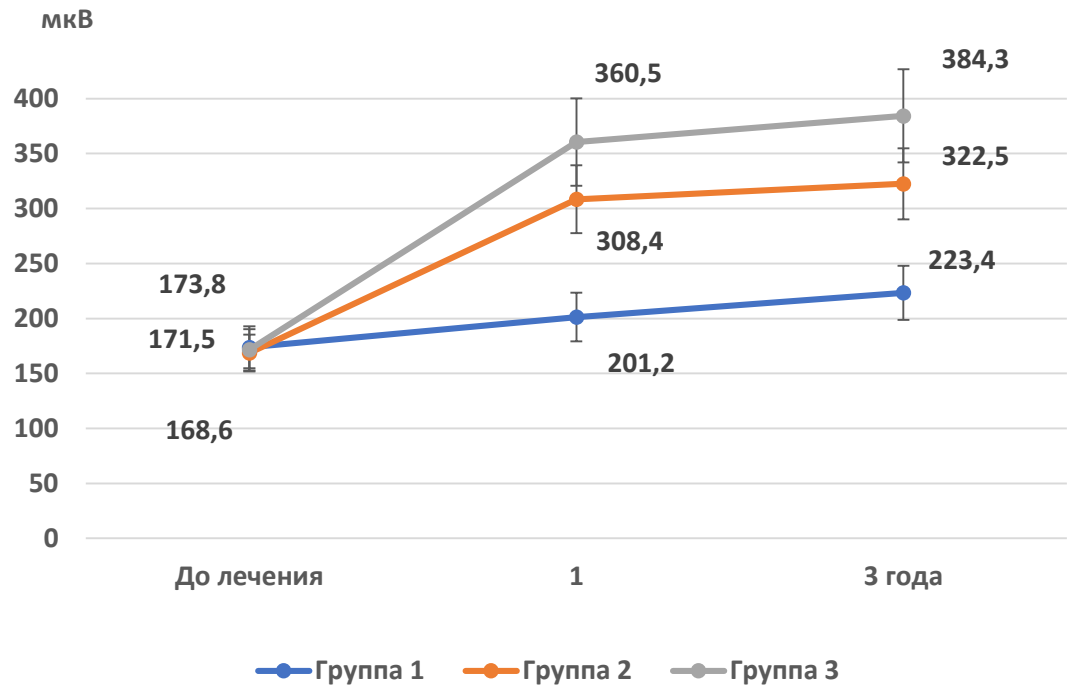


Figure 4.24 Dynamics of the amplitude of compression of the temporal muscle

One year after the treatment, the value of this parameter increased in group 1 - up to 201.2±16.3 mV, For the patients of group 2 - up to 308.4±31.4 mV, which was statistically significantly higher ($p<0.05$) than in group 1. The maximum value of this EMG indicator for the patients of group 3 was 360.5±19.5 mV,

which significantly ($p<0.05$) exceeded the corresponding levels of Groups 1 and 2.

Three years after the treatment, the magnitude of the amplitude of compression of the temporal muscle increased in all Groups, while the revealed ratio of the levels of the indicator remained the same, these amplitudes were: in group 1 - 223.4±19.0 mV, in group 2 - 322.5± 22.7 mV, in group 3 - 384.3±17.9 mV.

* * *

The obtained results indicate that the clinical effectiveness of the application of an interdisciplinary approach to the orthopedic rehabilitation of patients during the complete restoration of the dentition is confirmed by the data of instrumental studies. Thus, it has been established that the use of the proposed complex of therapeutic and rehabilitation measures contributes to the fact that for the patients who undergo a complete reconstruction of the dentition, after the end of treatment, a statistically significantly lower (relative to the comparison group) frequency of pathological manifestations is observed according to the occlusiogram, CTG, condylography,

electromyography. The identified shifts persist for 7 years of follow-up. The trend towards a significant improvement in the clinical characteristics of patients in the second and third groups, demonstrated in Chapter 3, is confirmed by the normalization of occlusal relationships and a decrease in the frequency of pathological signs detected using radiodiagnosis methods - arthritis, arthrosis of the TMJ, the presence of fluid in the joint space and other pathological changes. At the same time, an increase in the frequency of improvement in the state of the TMJ according to condylography was revealed, which was accompanied by a decrease in the frequency of detection of signs of protrusion-retrusion for the patients who, as part of planning measures for dental orthopedic rehabilitation, used an interdisciplinary approach, taking into account individual anatomical and physiological characteristics of the maxillofacial area.

CHAPTER 5. RESULTS OF THE AESTHETIC ANALYSIS

5.1 Dynamics of aesthetic characteristics of the face (facial analysis)

Evaluation of the number of patients with vertical displacement of the smile line showed that before treatment, displacement was observed in group 1 (A) - in 195 (88.1%) patients, in group 2 (B) - in 165 (84.6%) cases, in group 3 (C) - in 206 (88.0%) patients (Table 5.1).

After treatment, the value of the indicator decreased - a shift was noted in 146 (67.0%) patients of the first group, in 100 (51.3%) cases in group 2. In the third group, the value of this indicator was 29.9% (79 cases) and was statistically significantly lower ($p<0.05$) than the corresponding values in Groups 1 and 2.

One year after the treatment, the revealed ratio in Groups of patients remained, three years after there was a slight decrease in the number of patients with vertical mixing of the smile line. The values of these indicators were in group 1 - 148 (67.9%) patients, in group 2 - 97 (49.7%) in group 3 - 68 cases (29.1%).

Table 5.1 Number of patients with vertical shift of the smile line

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	195	88,1	165	84,6	206	88,0
After treatment	146	67,0	100	51,3	70	29,9*#

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One-year after	149	68,3	100	51,3	70	29,9*#
Three years' after	148	67,9	97	49,7	68	29,1*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

An assessment of the number of patients with smile symmetry disorders showed that prior to treatment, displacement was observed in 201 (92.2%) patients of the first group, just as often in the second group - in 185 (94.9%) patients, somewhat less frequently in group 3 - in 206 (88.0%) patients (Table 5.1). At the same time, there were no statistically significant intergroup differences.

After treatment, the frequency of these disorders was 61.5% in group 1 (134 cases), in group 2 the value of this indicator was significantly lower ($p<0.05$) - 28.7% (in 56 patients), in group 3 the value of this indicator was 15.8% (37 cases) and was statistically significantly lower ($p<0.05$) than the corresponding value in group 1.

One year after the treatment, the revealed ratio in Groups of patients remained, three years after there was a slight decrease in the number of patients with smile symmetry disorders, taking into account the width of the teeth of the upper jaw (14-24). In group 1, these disorders were observed in 128 (58.7%) patients, while in group 2 - only in 52 (27.2%) patients, statistically significantly less frequently ($p<0.05$) than in group 1. The minimum was the frequency of smile symmetry disorders in the third group, which was detected only in 36 cases (15.3%), is significantly lower ($p<0.05$) than the corresponding values in Groups 1 and 2.

Table 5.2 The number of patients with smile symmetry disorders, taking into account the width of the teeth of the upper jaw (14-24)

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	201	92,2	185	94,9	206	88,0
After treatment	134	61,5	56	28,7*	37	15,8*
One-year after	139	63,8	53	27,2*	37	15,8*#
Three years' after	128	58,7	52	27,2*	36	15,3*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

The analysis of such an indicator as the frequency of displacement of the gingival contour at the neck of the tooth showed that before the treatment this sign was detected in group 1 - in 165 (75.7%) patients, in Groups 2 and 3 as often, respectively, in 151 (77.4%) and 177 (75.6%) cases (Table 5.3). After treatment, the shift was noted somewhat less frequently - in 144 (67.0%) patients of the first group, while in group 2 - much less frequently ($p<0.05$) - in 39 (20.0%). In the third group, the value of this indicator was 9.4% (22 cases) and was statistically significantly lower ($p<0.05$) than the corresponding values in Groups 1 and 2.

One year after the treatment, the value of this indicator in group 1 was 63.8%, in group 2 it was statistically significantly lower than in the first group and amounted to 21.0% (41 cases). At the same time, For the patients of the third group 3 (C), the displacement of the gingival contour at the necks of the teeth was detected only in 7 (3.0%) patients, significantly less frequently ($p<0.05$) than in Groups 1 and 2.

The revealed ratio in Groups of patients remained, three years after there was a slight decrease in the number of patients with mixing of the gum contour at the necks of the teeth. The values of these indicators were in group 1 - 60.6% of patients, in group 2 - 29 (14.9%), in group 3 - 8 cases (3.4%). At the same time, the frequency of detection of this bias for the patients of groups 2 and 3 was significantly lower ($p<0.05$) than in the first group.

Table 5.3 The number of patients with displacement of the gingival contours at the necks of the teeth

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	165	75,7	151	77,4	177	75,6
After treatment	144	67,0	39	20,0*	22	9,4*#
One-year after	139	63,8	41	21,0*	7	3,0*#
Three years' after	132	60,6	29	14,9*	8	3,4*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

5.2 Analysis of the relationship between teeth and lips (dental analysis)

At the next stage of studying the dynamics of the aesthetic characteristics of the patients included in the study, a dentolabial analysis was performed. An assessment of the position of the incisors (interincisial line inclination) showed that the normal position was noted in group 1 - in 68 (31.2%) patients, in group 2 more often - in 74 patients (37.9%), in the third group less often - in 55 (23.5%) patients (Table 5.4). Deviation to the right was observed in 82 (37.6%) patients of the first group, in 51 patients (26.2%) of the second group and in 94 (40.2%) cases in group 3. Deviation to the left was noted in group 1 - in 68 (31.2%) patients, in group 2 - in 70 patients (35.9%), in group 3 - in 85 (36.3%) patients. No statistically significant intergroup differences were noted.

After the treatment, the normal position of the incisors was noted in 92 (42.2%) patients in group 1, while in the second group it was statistically significantly more common ($p<0.05$) in 135 patients (69.2%). For the patients of group 3, the value of this indicator was also significantly higher than in group 1, amounting to 73.5%.

Deviation to the right during this period was observed in group 1 - in 61 (28.0%) patients, in Groups 2 and 3 somewhat less frequently - in 30 (15.4%) and 24 (10.3%) patients. Deviation to the left was detected in 65 (29.8%) patients of the first group, in 30 patients of the second group (15.4%) and in 38 (16.2%) cases in group 3. At the same time, there were no statistically significant intergroup differences.

Similar ratios of the values of this indicator in Groups remained after 1 and 3 years.

Table 5.4 Dynamics of incisor position

Presence of deviation	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Norm	68	31,2	74	37,9	55	23,5
Right	82	37,6	51	26,2	94	40,2
Left	68	31,2	70	35,9	85	36,3
After treatment						
Norm	92	42,2	135	69,2*	172	73,5*
Right	61	28,0	30	15,4	24	10,3
Left	65	29,8	30	15,4	38	16,2
One year after						
Norm	92	42,2	135	69,2*	172	73,5*
Right	61	28,0	30	15,4	24	10,3
Left	65	29,8	30	15,4	38	16,2
Three years after						
Norm	92	42,2	135	69,2*	172	73,5*
Right	61	28,0	30	15,4	24	10,3
Left	65	29,8	30	15,4	38	16,2

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

The study of the dynamics of the position of the incisors showed that Before treatment, the normal position was noted in 78 (35.8%) patients of group 1, in 64 patients (32.8%) of group 2 and in 65 (27.8%) cases in the third group (table 5.5).

Deviation to the right was observed in group 1 - in 72 (33.0%) patients, in group 2 - in 61 patients (31.3%), in group 3 - in 84 (35.9%) patients, deviation to the left - in 68 (31.2%) patients of the first group, in group 2 - in 70 patients (35.9%), in group 3 - in 85 (36.3%) cases. However, no significant intergroup differences were found.

After the treatment, the ratio of indicators was as follows. The norm in group 1 was observed in 82 (37.6%) patients, in the second group statistically significantly more often ($p<0.05$) - in 125 patients (64.1%). In the third group, the value of this indicator was statistically significantly higher than in the first group ($p<0.05$) and amounted to 69.3% of patients.

Deviation to the right was observed in group 1 - in 71 (32.6%) patients, in group 2 - in 40 patients (20.5%), in group 3 - in 34 (14.5%) patients. Deviation to the left was detected in 65 (29.8%) patients of the first group, in 30 patients (15.4%) of the second group, in group 3 - in 38 (16.2%) patients.

Similar ratios of the values of this indicator in Groups remained after 1 year, three years after the values of these indicators did not change significantly. At the same time, the normal position of the fangs in group 1 was observed in 95 (43.6%) cases, in Groups 2 and 3 - significantly more often ($p<0.05$) than in the first group. The values of the indicators were 130 (66.7%) cases and 165 (70.5%), respectively.

Deviation to the right was observed in group 1 - in 56 (25.7%) patients, in group 2 - in 29 patients (14.9%), in the third group there were 27 (11.5%) such cases. Deviation to the left was noted in 67 (30.7%) patients of the first group, in group 2 - in 36 patients (18.4%), in group 3 - in 42 (18.0%) patients.

Table 5.5 Canine position assessment

Presence of deviation	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Norm	78	35,8	64	32,8	65	27,8
Right	72	33,0	61	31,3	84	35,9
Left	68	31,2	70	35,9	85	36,3
After treatment						
Norm	82	37,6	125	64,1*	162	69,3*
Right	71	32,6	40	20,5	34	14,5*
Left	65	29,8	30	15,4	38	16,2*
One year after						

Presence of deviation	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Norm	86	39,5	126	64,6*	167	71,4*
Right	58	26,6	38	19,5	29	12,4
Left	74	33,9	31	15,9*	38	16,2*
Three years after						
Norm	95	43,6	130	66,7*	165	70,5*
Right	56	25,7	29	14,9	27	11,5
Left	67	30,7	36	18,4	42	18,0*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

Comparison of the number of patients with impaired pronunciation of sounds Ф showed that the initial values of this indicator were at the same level and amounted to 155 (71.1%) patients in group 1 (A), 141 (72.3%) patients in group 2 (B).) case, in group 3 (C) - 167 (71.4%) patients (Table 5.6).

After treatment, these disorders, the proportion of such patients decreased and amounted to 134 (61.5%) cases in the first group, and in Groups 2 and 3 the value of this indicator was statistically significantly lower ($p<0.05$) relative to the corresponding levels of the indicator in group 1 - respectively 39 (20.0%) and 12 (5.1%).

After 1 and 3 years after the treatment, the revealed ratios in the Groups of patients remained practically unchanged.

Table 5.6 Number of patients with malfunction pronunciation of sound F

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	155	71,1	141	72,3	167	71,4
After treatment	134	61,5	39	20,0*	12	5,1*#

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
One-year after	139	63,8	41	21,0*	17	7,3*#
Three years' after	137	62,8	37	19,0*	18	6,4*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

An assessment of the number of patients with impaired pronunciation of sound C showed that before treatment, a shift was observed in group 1 (A) - in 181 (83.0%) patients, in group 2 (B) - in 173 (88.7%) cases, in group 3 (C) - in 197 (84.2%) patients (table 5.7).

After treatment, these disorders were detected in 144 (67.0%) patients of the first group, in 30 (15.6%) cases in group 2, in the third group, the value of this indicator was 5.1% (12 cases). The values of the indicator in Groups 2 and 3 were significantly lower ($p<0.05$) than those in group 1.

After 1 and 3 years, the number of patients with impaired pronunciation of the sound C in Groups 1 decreased to 129 (59.2%) and 122 (56.0%), respectively. In the second group, the value of this parameter was 31 (15.9%) and 29 (14.9%), respectively, the values of these indicators were statistically significantly lower ($p<0.05$) than those in group 1. In group 3, the number of patients with disorders the pronunciation of sound C in these terms was 14 (6.0%) and 11 (4.7%), respectively. The value of this parameter was significantly lower ($p<0.05$) than in the first group.

Table 5.7 Number of patients with malfunction pronunciation of sound S

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	181	83,0	173	88,7	197	84,2

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
After treatment	144	67,0	30	15,6*	12	5,1*
One-year after	129	59,2	31	15,9*	14	6,0*
Three years' after	122	56,0	29	14,9*	11	4,7*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

A study of the buccal corridor showed that Before treatment, the number of patients with normal parameters in group 1 was 50 (22.9%) patients. In the second and third groups, the values of these indicators were higher: in group 2 - 70 (35.9%) cases, in group 3 - 77 (32.9%) cases (Table 5.8). At the same time, no statistically significant intergroup differences were found.

A wide buccal corridor in group 1 was observed in 138 (63.3%) patients, in group 2 - in 100 patients (35.9%), in group 3 - in 120 (51.3%) cases, the absence of a buccal corridor was found in 30 (13.8%) patients of the first group, 25 patients (12.8%) of the second group and 37 (15.8%) patients of the third group.

After the treatment, the values of the indicator were as follows. The normal width of the buccal corridor was observed in group 1 in 28 (12.8%) patients, in group 2 it was statistically significantly more frequent in 112 (57.4%) cases. In the third group, the value of this indicator was significantly higher than in group 1, its value was 72.6% (170 patients) (table 5.8).

A wide buccal corridor in group 1 was observed in 150 (68.8%) patients, in Groups 2 and 3 - statistically significantly less frequently ($p<0.05$), respectively, in 69 patients (35.4%) and in 53 (22.7%) cases.

The absence of the buccal corridor was detected in group 1 - in 40 (18.4%) patients, in group 2 - in 14 patients (7.2%), in group 3 - in 11 (4.7%) patients. Similar ratios of the values of this indicator in Groups remained after 1 and 3 years.

Table 5.8 Dynamics of the assessment of the buccal corridor

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Wide	138	63,3	100	51,3	120	51,3
Normal	50	22,9	70	35,9	77	32,9
Absent	30	13,8	25	12,8	37	15,8
After treatment						
Wide	150	68,8	69	35,4*	53	22,7*
Normal	28	12,8	112	57,4*	170	72,6*
Absent	40	18,4	14	7,2	11	4,7
One year after						
Wide	150	68,8	69	35,4*	53	22,7*
Normal	28	12,8	112	57,4*	170	72,6*
Absent	40	18,4	14	7,2	11	4,7
Three years after						
Wide	150	68,8	69	35,4*	53	22,7*
Normal	28	12,8	112	57,4*	170	72,6*
Absent	40	18,4	14	7,2	11	4,7

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

Evaluation of the visualization of the central incisors from under the red border of the lips showed that Before treatment, normal visualization was noted in 86 (39.5%) patients in group 1, in group 2 - in 89 patients (45.6%), in the third group in 86 (36.8%) cases (Table 5.9).

An increase in visualization was observed in group 1 - in 59 (39.5%) patients, in the second and third Groups the values of these indicators were slightly lower - in group 2 - 44 cases (22.6%), in group 3 - 68 (29. 1%) of patients. However, no statistically significant differences were found.

A decrease in visualization was observed with approximately the same frequency - in 73 (33.4%) patients of the first group, in group 2 - in 62 patients (31.8%), in group 3 - in 80 (34.1%) patients.

After the treatment, normal visualization was noted in group 1 - in 102 (46.8%) patients, while in the second and third Groups, the value of this indicator was

statistically significantly higher ($p<0.05$) and amounted to 140 cases (71, 8%) in group 2 and 175 (74.8%) in group 3.

An increase in the visualization of the central incisors from under the red border of the lips was observed in group 1 - in 46 (21.1%) patients, in Groups 2 and 3, respectively, in 20 (10.3%) and 25 (10.7%) patients. The proportion of patients with a decrease in this indicator was noted in group 1 - in 70 (32.1%) patients, in the second and third Groups somewhat less frequently - in 35 (17.9%) and 34 (14.5%) patients. At the same time, no statistically significant intergroup differences were found.

Similar ratios of the values of this indicator in Groups remained after 1 and 3 years.

Table 5.9 Visualization of the central incisors from under the red border of the lips

Condition	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Increased	59	27,1	44	22,6	68	29,1
Normal	86	39,5	89	45,6	86	36,8
Reduced	73	33,4	62	31,8	80	34,1
After treatment						
Increased	46	21,1	20	10,3	25	10,7
Normal	102	46,8	140	71,8*	175	74,8*
Reduced	70	32,1	35	17,9	34	14,5*
One year after						
Increased	46	21,1	20	10,3	25	10,7
Normal	102	46,8	140	71,8*	175	74,8*
Reduced	70	32,1	35	17,9	34	14,5*
Three years after						
Increased	46	21,1	20	10,3	25	10,7
Normal	102	46,8	140	71,8*	175	74,8*
Reduced	70	32,1	35	17,9	34	14,5*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the criterion χ^2

5.3 Analysis of the aesthetic characteristics of the teeth (dental analysis)

At the next stage of the study of aesthetic characteristics, a dental analysis was carried out, one of the characteristics of which is the assessment of the location of the incisal edge relative to the occlusal plane (OP).

It was found that before treatment, the location of the cutting edge at the level of the OP in group 1 was noted in 88 (39.9%) patients, in the second group - in 84 patients (43.1%), in group 3 - in 84 (35.9%) patients (Table 5.10).

Location above the OP level was observed in 87 (40.4%) patients of the first group, in 75 cases (38.5%) in the second group, in the third group - in 96 (41.0%) patients.

The proportion of patients with an incisal edge below the OP was 19.7% in Group 1, 18.4% in Group 2, and 23.1% in Group 3. Thus, the distribution of patients by this indicator did not differ significantly.

After the treatment, it was found that the location of the cutting edge at the level of the OP in group 1 was observed in 108 (49.5%) patients, in Groups 2 and 3 more often - in 113 (57.9%) and 140 (59.8%) cases. The location above the OP level was noted with a frequency of 25.6-30.7%, and the proportion of patients in whom the cutting edge was below the OP was 19.8% in group 1, 15.4% in group 2, and 15.4% in group 3 - 14.6% of the case. There were no significant intergroup differences in the above indicators.

Similar ratios of the distribution of patients according to the location of the cutting edge relative to the occlusal plane in Groups of patients remained after 1 and 3 years.

Table 5.10 Dynamics of the distribution of patients according to the location of the cutting edge relative to the occlusal plane

Location of the cutting edge	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Over OP	87	39,9	75	38,5	96	41,0
At OP level	88	40,4	84	43,1	84	35,9
Under OP	43	19,7	36	18,4	54	23,1
After treatment						
Over OP	67	30,7	52	26,7	60	25,6
At OP level	108	49,5	113	57,9	140	59,8
Under OP	43	19,8	30	15,4	34	14,6
One year after						

Location of the cutting edge	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Over OP	67	30,7	52	26,7	60	25,6
At OP level	108	49,5	113	57,9	140	59,8
Under OP	43	19,8	30	15,4	34	14,6
Three years after						
Over OP	67	30,7	52	26,7	60	25,6
At OP level	108	49,5	113	57,9	140	59,8
Under OP	43	19,8	30	15,4	34	14,6

Evaluation of the number of patients with changes in the size of the upper central incisors showed that before the intervention, these changes were observed in the majority of patients included in the study. In the first group, such a sign was noted in 158 (72.5%) patients, in group 2 - in 143 (73.3%) cases, in group 3 - in 157 (67.1%) patients (Table 5.11).

After the treatment, the relative number of patients with these changes decreased to 70 (32.1%) cases in the first group, while in group 2 the value of this indicator was lower - 18.0% (35 patients), in the third group it was statistically significantly less ($p<0.05$) than in the first group, patients with a similar symptom - 12.8% (30).

The ratios of the values of this indicator in the Groups of patients after 1 and 3 years were similar.

Table 5.11 Number of patients with changes in the size of the upper central incisors

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	158	72,5	143	73,3	157	67,1
After treatment	70	32,1	35	18,0	30	12,8*
One-year after	70	32,1	35	18,0	30	12,8*
Three years' after	70	32,1	35	18,0	30	12,8*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

The study of the dynamics of the number of patients with changes in the size of the lower central incisors showed that before treatment, these changes were observed in 161 (73.9%) patients of the first group, in 163 (84.9%) cases in group 2 and in 169 (72.2%) %) of patients in group 3 (Table 5.12).

After treatment, this sign was detected in 134 (61.5%) patients of the first group, while in the second group the proportion of such patients was lower - 41.0% (80 people). In group 3 it was 29.9% in the third group, their share was statistically significantly lower ($p<0.05$) than in group 1.

The ratios of the values of this indicator in Groups of patients remained the same 1 and 3 years after the treatment.

Table 5.12 Number of patients with changes in the size of the lower central incisors

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	161	73,9	163	84,9	169	72,2
After treatment	134	61,5	80	41,0	70	29,9*
One-year after	134	61,5	80	41,0	70	29,9*
Three years' after	134	61,5	80	41,0	70	29,9*

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

The analysis of the dynamics of the indicator of the number of patients with defects of interdental approximal contacts showed that Before treatment, these changes were detected in group 1 - in 201 (92.2%) patients, in group 2 - in 183 (93.9%) cases, in group 3 - in 219 (93.6%) patients (Table 5.13).

After treatment, these disorders were observed in 164 (75.2%) cases, in 10 (5.1%) cases in group 2 and in 15 (6.4%) patients in the third group. The indicator values in Groups 2 and 3 were statistically significantly lower ($p<0.05$) than the corresponding value in group 1.

One year after the treatment, the identified ratio in Groups of patients remained, three years after the number of patients with impaired interdental approximal contacts in group 1 - 172 (78.0%) patients, in Groups 2 and 3 decreased, respectively, to 8 (4.1 %) and 17 cases (7.3%).

Table 5.13 Number of patients with impaired interdental approximal contacts

Study timeline	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment	201	92,2	183	93,9	219	93,6
After treatment	164	75,2	10	5,1*	15	6,4*
One-year after	170	78,0	10	5,1*	16	6,8*
Three years' after	172	78,0	8	4,1*	17	7,3*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

Assessment of the inclination of the lower incisors for the patients included in the study indicated that the initial frequency of this indicator in group 1 was 39.0% (85 cases), in group 2 - 36.4% (71), in group 3 - 35 .4% (83) (Table 5.14).

Lingual inclination was observed in group 1 - in 51 (23.4%) patients, in group 2 - in 56 patients (28.7%), in group 3 - in 43 (18.4%) patients, buccal tilt was detected with a frequency of 37.6%, 34.9% and 46.1%, respectively. There were no statistically significant intergroup differences in these indicators.

After the treatment, the following changes in the slope of the lower incisors were noted. The absence of a sign in group 1 was observed in 107 (49.1%) patients, while in the second group the value of this indicator was statistically significantly higher ($p<0.05$) - 119 cases (61.1%), in group 3 - 140 (59.8%) patients.

Lingual inclination was observed in group 1 - in 40 (18.3%) patients, in group 2 -

in 30 cases (15.3%), in group 3 - in 35 (15.0%) patients, buccal tilt was detected in 71 (32.6%), 46 (23.6%) and (25.2%) patients, respectively, in Groups 1, 2 and 3.

Similar ratios of the values of this indicator in Groups remained after 1 and 3 years. There were no significant intergroup differences in these indicators in all Study timeline.

Table 5.14 Presence of inclination of the lower incisors

Inclination of the lower incisors	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
No	85	39,0	71	36,4	83	35,5
Lingual	51	23,4	56	28,7	43	18,4
Buccal	82	37,6	68	34,9	108	46,1
After treatment						
No	107	49,1	119	61,1*	140	59,8*
Lingual	40	18,3	30	15,3	35	15,0
Buccal	71	32,6	46	23,6	59	25,2
One year after						
No	107	49,1	119	61,1*	140	59,8*
Lingual	40	18,3	30	15,3	35	15,0
Buccal	71	32,6	46	23,6	59	25,2
Three years after						
No	107	49,1	119	61,1*	140	59,8*
Lingual	40	18,3	30	15,3	35	15,0
Buccal	71	32,6	46	23,6	59	25,2

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

Absence of wrong overlapping teeth (overbite - overjet) was detected Before treatment in 130 (59.6%) patients of the first group, in group 2 - in 100 patients (51.3%), in group 3 - in 130 (55.6%) cases (Table 5.15). An increase in overlap was observed in 75 (34.4%) patients of the first group, in 50 cases (25.6%) in group 2 and in 45 (19.2%) patients of the third group.

The decrease in overlap was noted in group 1 - in 13 (6.0%) patients, in group 2 - in 45 patients (23.1%), in group 3 - in 59 (25.2%) patients.

After the treatment, the absence of defects of the overlap of the teeth was noted in 142 (65.1%) patients of the first group, while in Groups 2 and 3, the value of this indicator was 152 (78.0%) and 173 (73.9%) cases, respectively.

An increase was observed in group 1 - in 66 (30.3%) patients, in group 2 - in 28 patients (14.3%), in group 3 - in 30 (12.8%) patients, thus, the values of the indicators in the second and third Groups were statistically significantly lower ($p<0.05$) than the corresponding level in group 1. A decrease was noted in 10 (4.6%) patients of the first group, in the second group in 15 patients (7.7%), in group 3 - in 41 (13.3%) patients.

Similar ratios of the values of this indicator in Groups remained after 1 and 3 years.

Table 5.15 The presence of defects of the overlap of the teeth - overbite - overjet

Location of the cutting edge	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Enlarged	75	34,4	50	25,6	45	19,2
Norm	130	59,6	100	51,3	130	55,6
Reduced	13	6,0	45	23,1	59	25,2
After treatment						
Enlarged	66	30,3	28	14,3*	30	12,8*
Norm	142	65,1	152	78,0	173	73,9
Reduced	10	4,6	15	7,7	41	13,3
One year after						
Enlarged	66	30,3	28	14,3*	30	12,8*
Norm	142	65,1	152	78,0	173	73,9
Reduced	10	4,6	15	7,7	41	13,3
Three years after						
Enlarged	66	30,3	28	14,3*	30	12,8*
Norm	142	65,1	152	78,0	173	73,9
Reduced	10	4,6	15	7,7	41	13,3

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

CHAPTER 6. RESULTS OF INTERDISCIPLINARY RESEARCH IN PATIENTS IN NEED OF COMPLETE DENTITION RESTORATION

6.1 Features of manifestations of obstructive sleep apnea syndrome

6.1.1 Polysomnography results

Table 6.1 presents the results of assessing the dynamics of the apnea-hypopnea index (AHI) in Groups of patients. It was found that the initial indicators of AHI Before treatment were comparable in all three Groups: the average value of this indicator in group 1 was 15.8±1.2, in group 2 - 15.3±2.3, in group 3 - 15.6± 1.8. No statistically significant differences were found ($p>0.05$ for all comparisons).

One year after the start of treatment and rehabilitation measures in each group, positive dynamics was observed in the form of a decrease in the average AHI, while the most expressed decrease in this indicator was recorded in group 3, where the average AHI reached 9.1±1.3. A slightly less expressed decrease was noted for the patients of the second group — the value of this parameter one year after was 10.2±1.5, while in group 1 the AHI value was 13.9±0.9. Thus, in group 3, AHI during this period of the study was statistically significantly lower ($p<0.05$) compared to the corresponding level in group 1, however, it was comparable to the corresponding value of the indicator in group 2 ($p>0.05$).

There were no statistically significant differences between the average AHI values in Groups 1 and 2 one year after follow-up ($p>0.05$).

During the follow-up, in all three Groups of patients, a further decrease in the average value of AHI was noted, while the most expressed dynamics was typical for group 3, where the average value of this parameter was three years after 5.3 ± 0.5, after 5 years 5.4 ±0.8 and decreased to 4.8±0.5 seven years after.

For the patients of the second group, the decrease in AHI was somewhat less expressed: the average value of the indicator in these terms was 7.9±0.8, 7.4±1.6 and 6.3±0.7, respectively. At all times, the AHI value in group 2 was statistically significantly higher compared to group 3 ($p<0.05$ for all comparisons).

For the patients of the first group, the dynamics of AHI was the least expressed: three years after the start of treatment and rehabilitation measures, the average AHI was 11.8±1.5, five years after - 12.2±2.4, seven years after - 11.2 ±2.9. At the same time, in all Study timelines, the values of this parameter were statistically significantly higher ($p<0.05$) compared to the corresponding values of the indicator in the second and third Groups.

Table 6.1 Dynamics of the apnea-hypopnea index, per hour

Study timeline	Group 1 (A) (n=32)	Group 2 (B) (n=29)	Group 3 (C) (n=34)
Before treatment	15,8±1,2	15,3±2,3	15,6±1,8
One-year after	13,9±0,9	10,2±1,5	9,1±1,3*
Three years' after	11,8±1,5	7,9±0,8*	5,3±0,5*#
Five years' after	12,2±2,4	7,4±1,6*	5,4±0,8*#
Seven years' after	11,2±2,9	6,3±0,7*	4,8±0,5*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

The levels of basal oxygen saturation Before treatment were 89.8±6.5% for the patients of group 1, 89.5±2.5% in group 2 and 88.9±5.1% in group 3 (Table 6.2). In the dynamics in all Groups, there was some increase in the average basal saturation, however, this increase in the indicator was insignificant, and the average values of this indicator in the Groups were comparable to each other throughout the entire 7-year follow-up period.

By the end of the observation period, the average value of basal oxygen saturation in group 1 was 90.6±4.4%, in group 2 - 93.2±2.2%, while in group 3 the level of this indicator was 94.9 ±4.2%. However, all intergroup differences in the average value of this parameter were statistically insignificant in all periods of observation ($p>0.05$).

Table 6.2 Dynamics of the basal saturation index, %

Study timeline	Group 1 (A) (n=32)	Group 2 (B) (n=29)	Group 3 (C) (n=34)
Before treatment	89,8±6,5	89,5±2,5	88,9±5,1

Study timeline	Group 1 (A) (n=32)	Group 2 (B) (n=29)	Group 3 (C) (n=34)
One-year after	90,1±5,2	90,6±3,6	92,3±4,9
Three years' after	89,8±4,8	91,4±2,3	93,8±3,7
Five years' after	90,4±6,1	92,7±3,8	94,5±2,6
Seven years' after	90,6±4,4	93,2±2,2	94,9±4,2

The levels of the minimum saturation indicator before the start of treatment and rehabilitation measures were also comparable in all three Groups of the study, while no statistically significant intergroup differences were found (Table 6.3).

One year after the start of treatment and rehabilitation measures in all Groups of patients, a decrease in the level of the average minimum saturation was observed, and the most expressed dynamics was typical for group 3, where the average value of this parameter reached 63.2±5.2%. In the second group, the decrease in this indicator was less expressed - up to 71.4±5.1%, while in group 1 the dynamics was minimal, the level of minimal saturation one year after was 74.3±3.2%. The value of the indicator was statistically significantly higher than the corresponding indicator in group 3 ($p<0.05$), but was comparable to that in group 2

In the course of further observation, patients of all groups showed a further decrease in the average minimum saturation, while the most expressed dynamics compared to the initial level remained in group 3. So, three years after for the patients of this group, the average value of the minimum saturation reached 62.8 ± 3 .7%, five years after – 60.1±2.8%, seven years after – 59.2±3.2%.

In the second group of patients, the decrease in the level of this parameter was somewhat less expressed, and the value of the minimum saturation in the indicated observation periods was 66.8±3.9%, 66.3±5.2% and 65.3±3.5%, respectively. . At the same time, if 3 and 5 years after the start of the study, the minimum saturation in Groups 2 and 3 were comparable, no statistically significant differences were found ($p> 0.05$), then at the end of the observation seven years after, the value of this indicator was statistically significantly lower in compared with group 2 ($p<0.05$).

In the first group, a further decrease in the minimum saturation index was also observed, however, the dynamics was insignificant: three years after, the average value of the indicator was 70.1±5.1%, five years after - 67.4±4.6%, seven years after - 69 .2±3.4%. At each period, the level of this PSG indicator was statistically significantly

higher compared to group 3 ($p<0.05$ for each observation period), however, there were no statistically significant differences in the values in the first and second Groups in all Study timelines ($p>0, 05$ for all comparisons).

Table 6.3 Dynamics of minimum saturation, %

Study timeline	Group 1 (A) (n=32)	Group 2 (B) (n=29)	Group 3 (C) (n=34)
Before treatment	75,4±5,5	76,2±4,7	75,1±3,1
One-year after	74,3±3,2	71,4±5,1	63,2±5,2*
Three years' after	70,1±5,1	66,8±3,9	62,8±3,7*
Five years' after	67,4±4,6	66,3±5,2	60,1±2,8*
Seven years' after	69,2±3,4	65,3±3,5	59,2±3,2*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

6.1.2 Sleep characteristics

Analysis of sleep characteristics for the patients who underwent treatment and rehabilitation measures did not reveal significant differences in sleep efficiency parameters before the start of treatment, the values of the indicator in Groups 1, 2 and 3 were 67.4±3.6%, respectively; 65.7±2.8% and 68.2±4.9% (Table 6.4).

After 1 year, it was noted that the average sleep efficiency indicators in all three Study Groups increased, with the most significant change observed in group 3, where the average value of this parameter one year after was statistically significantly higher than that in group 1 ($p<0.05$).

In Groups 1 and 2, the dynamics of sleep efficiency was less expressed, and the average values of the parameter were comparable.

During the follow-up, it was found that for the patients of the first group, the dynamics of this indicator was the least expressed, the value of the sleep efficiency index three years after was 71.4 ± 3.8%, five years after - 70.8 ± 5.7%, seven years after – 72.2±4.5%. For the patients of the second group, the changes in the indicator were more significant, during the indicated periods of observation, the indicator of sleep efficiency increased, amounting to 77.4±2.4%, 79.2±3.2% and 81.8±5.3%, respectively. At the same time, during all periods of observation, sleep efficiency in group 2 was statistically significantly higher compared to the corresponding values in group 1 ($p<0.05$).

For the patients of group 3, the increase in the average sleep efficiency was the most expressed: three years after the start of treatment and rehabilitation measures, the average value of the indicator was 89.7 ± 4.1%, five years after it reached 91.8 ± 5.6%, and seven years after – 91.4±3.5%. During all follow-up periods, sleep efficiency indicators in Group 3 were statistically significantly higher compared to the corresponding values in Groups 1 and 2 ($p<0.05$).

Table 6.4 Dynamics in sleep efficiency indicator (%)

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	67,4±3,6	65,7±2,8	68,2±4,9
One-year after	69,23±4,2	71,6±4,0	78,2±3,8*
Three years' after	71,4±3,8	77,4±2,4*	89,7±4,1*#
Five years' after	70,8±5,7	79,2±3,2*	91,8±5,6*#
Seven years' after	72,2±4,5	81,8±5,3*	91,4±3,5*#

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

Table 6.5 presents the results of a comparative scoring of the sleep quality of

patients in dynamics in the Groups of the study during treatment and rehabilitation. Initially, before the start of treatment, the distribution of patients according to the results of the sleep quality score in all three Study Groups was comparable ($p>0.05$ for all intergroup comparisons), while patients with borderline sleep characteristics prevailed in each group - 72.0% in group 1, 67.7% in group 2 and 62.4% in group 3. The proportions of patients with favorable and unfavorable characteristics were significantly lower, which amounted to 17.0% and 11.0%, respectively, in group 1, 23.1% and 9.2%, respectively, in group 2 and 29.9% and 7.7% in group 3.

One year after and three years after the observation, in all Groups there was a trend towards a decrease in the proportion of patients with unfavorable and borderline sleep characteristics and an increase in the proportion of patients with favorable sleep characteristics, however, the dynamics was insignificant, and the distribution of patients according to the structure of sleep characteristics within all study groups was still remained comparable ($p>0.05$ for all intergroup comparisons).

Five years after and seven years after, after the start of treatment and rehabilitation in group 1, there were no significant changes in the distribution of patients according to sleep characteristics - by the end of the 7-year follow-up period, the proportion of patients in the group with unfavorable sleep characteristics was 7.3%, with borderline characteristics - 75.7%, with favorable characteristics - 17.0%. In group 2, the dynamics were somewhat more expressed, and by the end of the study, the proportion of patients with unfavorable and borderline sleep characteristics decreased to 5.1% and 64.6%, respectively, while the proportion of patients with favorable sleep characteristics in group 2 at the end of the study reached 30.3%, however, there were statistically significant intergroup differences when comparing the distributions of patients by sleep characteristics in Groups 1 and 2 both five years after and seven years after the start of treatment and rehabilitation was not detected ($p>0.05$ for all comparisons).

In group 3, the dynamics of sleep quality characteristics was the most expressed. Five years after the start of the study, the proportion of patients with adverse sleep characteristics decreased to 4.3%, and seven years after it reached 0.9%, which was statistically significantly lower compared to group 1 ($p<0.05$ for both comparisons), however, comparable with the corresponding values of the indicator in group 2 ($p>0.05$ at both time points). The proportion of patients with borderline sleep characteristics did not change significantly and was 59.4% five years after and 58.1% seven years after follow-up, being comparable to the corresponding parameter values in Groups 1 and 2 ($p>0.05$ for all comparisons). In contrast, the proportion of patients with favorable sleep characteristics increased to 38.9% and 41.0% five years after and 7 years, respectively, which was statistically significantly higher compared to group 1 ($p<0.05$ at both time points), however, there were no statistically significant intergroup

differences in this indicator between Groups 2 and 3 (p>0.05 for both comparisons).

Table 6.5 The results of scoring the quality of sleep of patients

Sleep characteristics	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
Before treatment						
Unfavorable < 19 points	24	11,0	18	9,2	18	7,7
Borderline 19-21 points	157	72,0	132	67,7	146	62,4
Favorable >21 points	37	17,0	45	23,1	70	29,9
One year after						
Unfavorable < 19 points	22	10,1	16	8,2	14	6,0
Borderline 19-21 points	154	70,6	131	67,2	140	59,8
Favorable >21 points	42	19,3	48	24,6	80	34,2
Three years after						
Unfavorable < 19 points	19	8,7	21	10,8	10	4,3
Borderline 19-21 points	161	73,9	120	61,5	138	59,0
Favorable >21 points	38	17,4	54	27,7	86	36,7
Five years after						
Unfavorable	16	7,3	11	5,7	4	1,7*

Sleep characteristics	Group 1 (A) (n=218)		Group 2 (B) (n=195)		Group 3 (C) (n=234)	
	abs.	%	abs.	%	abs.	%
< 19 points						
Borderline 19-21 points	166	76,2	128	65,6	139	59,4
Favorable >21 points	36	16,5	56	28,7	91	38,9*
Seven years after						
Unfavorable < 19 points	16	7,3	10	5,1	2	0,9*
Borderline 19-21 points	165	75,7	126	64,6	136	58,1
Favorable >21 points	37	17,0	59	30,3	96	41,0*

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the criterion χ^2

6.2 Dynamics of quality of life indicators

This section presents data on the dynamics of individual aspects of the quality of life of patients assessed using the Oral Health Impact Profile-14 (OHIP-14) questionnaire, as well as the total score of this questionnaire. As can be seen from Table 6.6, before the start of treatment, the average scores for the indicator "Problems with eating" were 17.4 ± 1.6 points in group 1, 18.7 ± 2.8 points in group 2 and 18.2 ± 1.9 in group 3, there were no statistically significant intergroup differences in this indicator ($p>0.05$ for all comparisons).

One year after the start of treatment and rehabilitation in each of the study groups, there was a decrease in the average values of the "Problems with eating" indicator. In group 1, the average value of the parameter one year after decreased to 13.3±1.2 points. In group 2, the average value of the indicator at this time point reached 10.6±2.0 points, which was comparable to the corresponding indicator in group 1 ($p>0.05$). In group 3

one year after the start of treatment, the dynamics was the most expressed and the average score for assessing problems with food intake was 8.2±0.8 points, which was statistically significantly lower compared to group 1 ($p<0.05$), however groups 2 and 3 were comparable to each other in terms of the value of this parameter ($p>0.05$).

During the follow-up in group 1, there was no further decrease in the average score of problems with food intake: the average value of the indicator was 14.4±1.8 points three years after treatment and rehabilitation measures, 14.0±0.7 points five years after and 15.2±1.5 points seven years after. In group 2, a slight decrease in the average values of this parameter was recorded - up to 9.3±2.4 points three years after, 9.2±1.2 points five years after and 8.8±1.3 points seven years after. The dynamics of the absolute value of the indicator "Problems with eating" in group 2 was insignificant, however, at each of the indicated time points in this group, the average value of this parameter was statistically significantly lower compared to group 1 ($p<0.05$ for all comparisons).

In group 3, the decrease in the average values of the assessment of problems with eating was most expressed: three years after the start of treatment, the average value of the indicator reached 6.7 ± 0.5 points, five years after it was 6.8 ± 0.6 points, and seven years after – 6.4±0.3 points. In the analysis of intergroup differences in the average indicators of evaluation of problems with food intake at the indicated observation periods in group 3, the average values of the indicator were statistically significantly lower compared to both group 1 and group 2 ($p<0.05$ for all intergroup comparisons in all time points).

Table 6.6 Dynamics of the indicator "Problems with eating" of the OHIP-14 questionnaire (M±m)

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	17,4±1,6	18,7±2,8	18,2±1,9
One-year after	13,3±1,2	10,6±2,0	8,2±0,8*
Three years’ after	14,4±1,8	9,3±2,4*	6,7±0,5*#
Five years’ after	14,0±0,7	9,2±1,2*	6,8±0,6*#
Seven years’ after	15,2±1,5	8,8±1,3*	6,4±0,3*#

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

The average values of the indicator "Problems in communication" of the OHIP-14 questionnaire before the start of treatment and rehabilitation measures in Groups 1, 2 and 3 were 15.4±1.5 points, 15.8±2.2 points and 15.2± 1.4 points, respectively (Table 6.7). There were no statistically significant intergroup differences in the initial assessment of communication problems for the patients ($p>0.05$ for all comparisons).

In the dynamics one year after the start of treatment and rehabilitation in each of the study groups, there was a decrease in the average score of problems in communication: in group 1, the average value of this indicator one year after was 10.2 ± 0.9 points, in group 2 - 7.6 ±1.0 points, in group 3 - 6.0±1.2 points. In Groups 2 and 3, the dynamics were more expressed compared to group 1, and the average scores for communication problems in Groups 2 and 3 were statistically significantly lower compared to the corresponding parameter in group 1 ($p<0.05$ for both comparisons), however, between did not differ statistically significantly ($p>0.05$).

During follow-up, all three Groups continued to experience a downward trend in the average Communication Problems score on the OHIP-14. In group 1, the average value of this parameter three years after the start of treatment and rehabilitation decreased to 9.4±0.6 points, five years after it was 8.8±1.1 points, and seven years after it reached 7.2±1, 5 points. In group 2, the dynamics of the indicator from the initial value was more significant: in the indicated periods of observation, the average estimates of problems in communication were 7.3±1.1 points, 7.4±0.5 points and 7.6±0.7 points, respectively, and were statistically significantly higher compared to the corresponding values of the indicator in group 1 ($p<0.05$ at all-time points).

The most significant dynamics was observed in group 3, where the average values of the indicator three years after, five years after and seven years after the start of treatment and rehabilitation measures were 5.7±0.4 points, 5.9±0.6 points and 5. 2±0.8 points, respectively. At the same time, at each of the specified time points, the average assessment of communication problems in group 3 was statistically significantly higher compared to both group 1 and group 2 ($p<0.05$ for all intergroup comparisons in all observation periods).

Table 6.7 Dynamics of the indicator "Problems in communication" of the OHIP-14 questionnaire (M±m)

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	15,4±1,5	15,8±2,2	15,2±1,4
One-year after	10,2±0,9	7,6±1,0*	6,0±1,2*
Three years' after	9,4±0,6	7,3±1,1*	5,7±0,4*#
Five years' after	8,8±1,1	7,4±0,5*	5,9±0,6*#
Seven years' after	9,2±1,3	7,6±0,7*	5,2±0,8*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

As can be seen from Table 6.8, the initial average scores of problems in everyday life based on the results of filling out the OHIP-14 questionnaire before the start of treatment and rehabilitation activities in the Groups of the study were also comparable: in group 1, the average value of the indicator was 13.4 ± 2.0 points, in group 2 - 14.7±1.8 points, in group 3 - 14.2±0.9 ($p>0.05$ for all comparisons). One year after the start of treatment and rehabilitation in each of the three groups, there was a decrease in the average score of problems in everyday life with the achievement of average values of the indicator equal to 9.2±1.6 points, 6.6±0.6 points and 6.2± 1.2 points, respectively.

In group 1, the dynamics of this parameter turned out to be the least expressed, and the average value of the assessment of problems in everyday life was statistically significantly higher compared to Groups 2 and 3 ($p<0.05$ for both comparisons), while groups 2 and 3 were comparable to each other for this indicator ($p>0.05$).

At the late stages of observation in each of the three groups, a further decrease in the "Problems in everyday life" indicator of the OHIP-14 questionnaire was observed, with the most expressed dynamics recorded in group 3: the average value of the

indicator three years after after the start of therapy was 5.5±1.1 points, five years after - 4.7±0.7 points, seven years after - 4.6±0.5 points. In group 2, the decrease in the assessment of problems in everyday life was somewhat less expressed, and the average values of this parameter in the indicated periods were 6.4±1.3 points, 6.2±0.3 points and 5.8±0.7 points, respectively.

In group 3, the change in the indicator "Problems in everyday life" was the least significant, and the average value of this parameter reached 7.4±0.8 points three years after observation, 7.8±0.7 points five years after and 7.2 ±1.5 points seven years after.

Thus, three years after the start of treatment and rehabilitation, group 3 achieved statistically significantly lower rates of assessing problems in everyday life compared to group 1 ($p<0.05$), which were comparable to those in group 2 ($p>0.05$); the average values of this parameter in Groups 1 and 2 three years after the observation were not statistically significantly different ($p>0.05$). Subsequently, five years after and seven years after the start of treatment, the average values of the indicator in group 2 were statistically significantly lower compared to group 1, while in group 3 they were statistically significantly lower compared to both group 1 and group 2 ($p<0.05$ for all intergroup comparisons at the indicated follow-up times).

Table 6.8 Dynamics of the indicator "Problems in everyday life" of the OHIP-14 questionnaire (M±m)

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	13,4±2,0	14,7±1,8	14,2±0,9
One-year after	9,2±1,6	6,6±0,6*	6,2±1,2*
Three years' after	7,4±0,8	6,4±1,3	5,5±1,1*
Five years' after	7,8±0,7	6,2±0,3*	4,7±0,7*#
Seven years' after	7,2±1,5	5,8±0,7*	4,6±0,5*#

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion

- differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

Table 6.9 presents the results of the analysis of the dynamics of the total score of the OHIP-14 questionnaire against the background of ongoing treatment and rehabilitation measures. Before the start of treatment and rehabilitation, the quality of life indicators in the Groups of the study were comparable: the average score for OHIP-14 in group 1 was 46.2±2.5 points, in group 2 - 49.2±4.1 points, in group 3 - 47.6±3.2 points ($p>0.05$ for all intergroup comparisons).

In the dynamics one year after the start of treatment in all Groups, a decrease in the average value of OHIP-14 was observed, however, in Groups 2 and 3, the dynamics was more expressed: in group 1, the average value of this indicator one year after was 32.7 ± 3.7 points, while in Groups 2 and 3 the corresponding values were 24.8±2.9 points and 20.4±4.0 points, respectively. Scores in Groups 2 and 3 were statistically significantly lower compared to Group 1 ($p<0.05$ for both comparisons), but Groups 2 and 3 were comparable ($p>0.05$).

In subsequent periods of observation - after 3, 5 and 7 years - in all three Groups of the study, the dynamics of the quality of life was less expressed than in the first period of observation. In Groups 1 and 2, only a slight decrease in the average score for OHIP 14 was recorded. Thus, in group 1, the average values of this indicator were equal to 31.2 ± 2.4 points three years after, 30.6 ± 4.1 points five years after and 31.6±3.3 points seven years after; in group 2, the average OHIP-14 scores at the indicated times were 23.1±3.2 points, 22.6±2.5 points, and 22.4±1.4 points, respectively.

However, despite a slight absolute decrease in the average score for OHIP 14, in each of the observation periods after the start of treatment and rehabilitation measures in group 2, the average values of the indicator were statistically significantly lower compared to the corresponding parameters in group 1 ($p<0.05$ for all comparisons). In group 3, the average score for OHIP-14 three years after the start of treatment was 17.9±1.7 points, five years after - 17.4±1.8 points, seven years after - 16.2±0.9 points. In this study arm, the average OHIP-14 score at each of the time points considered was statistically significantly lower compared to both arm 1 and arm 2 ($p<0.05$ for all comparisons).

Table 6.9 Dynamics of the total indicator of the OHIP-14 questionnaire (M±m)

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	46,2±2,5	49,2±4,1	47,6±3,2

One-year after	32,7±3,7	24,8±2,9*	20,4±4,0*
Three years' after	31,2±2,4	23,1±3,2*	17,9±1,7*#
Five years' after	30,6±4,1	22,6±2,5*	17,4±1,8*#
Seven years' after	31,6±3,3	22,4±1,4*	16,2±0,9*#

Note:
* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 (A) according to the Mann-Whitney criterion
# - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 2 (B) according to the Mann-Whitney criterion

6.3 Patients' assessment of external changes using the GAIS scale

Table 6.10 shows the indicators for assessing external changes on the GAIS scale. As can be seen, if Before treatment the levels of this scale did not differ in Groups of the study, one year after there was a statistically significant increase in this indicator in Groups 2 and 3, while the value of the GAIS indicator in both Groups was significantly higher than in group 1 ($p<0, 05$).

Three years after, the level of assessment of external changes increased in all Groups, but for the patients in whose treatment the multidisciplinary approach to dental orthopedic rehabilitation proposed by us was implemented, the value of this parameter was statistically significantly higher ($p<0.05$) than in Groups 1 and 2. The ratio of the values of this indicator was similar in the subsequent periods of observation, after 5 and 7 years.

Table 6.10 Dynamics of the indicator for assessing external changes according to the GAIS scale, points

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Before treatment	1,52±0,24	1,50±0,20	1,56±0,15
One-year after	1,58±0,12	1,77±0,17*	2,04±0,13*

Study timeline	Group 1 (A) (n=218)	Group 2 (B) (n=195)	Group 3 (C) (n=234)
Three years' after	1,67±0,10	2,09±0,14*	2,18±0,11*#
Five years' after	1,78±0,23	2,20±0,12*	2,38±0,14*#
Seven years' after	1,87±0,16	2,17±0,10*	2,43±0,13*#

Note:

* - differences are statistically significant ($p<0.05$) relative to the corresponding indicator in group 1 according to Student's criterion

The results obtained indicate that the use of the methodology of an interdisciplinary approach is a key factor in the high safety and clinical effectiveness of orthopedic treatment of patients in need of total restoration of the dentition. It has been established that the use of the developed algorithm for diagnosing and planning orthopedic rehabilitation contributes to the fact that in this group of patients, after the treatment, there are significantly more expressed changes in polysomnography parameters, indicating an improvement in sleep characteristics. These changes were confirmed by the normalization of the parameters of basal saturation, minimum saturation, apnea-hypopnea index, sleep efficiency index and sleep quality score for the patients of the third and second groups compared with group 1.

Also, the obtained results indicate an increase in the level of dental quality of life for the patients of all three groups, while in group 3, where the method we proposed for managing patients in need of total restoration of the dentition was used, higher values of the scales of the OHIP-14 questionnaire "Problems eating", "Problems in communication", "Problems in everyday life", as well as the overall indicator of this questionnaire.

A statistically significantly higher satisfaction of patients with the treatment and rehabilitation measures was also noted - the increase in the level of the GAIS scale was maximum in the group where the complex approach to rehabilitation proposed by us was used.

DISCUSSION OF THE OBTAINED DATA

According to various authors, TMJ pathology for the patients with disorders of the dentition ranges from 34 to 87% [Gil-Martinez A. et al., 2018; MarChatzopoulos G.S., Wolff L.F., 2020]. The TMJ is one of the most active joints in the human body. The complexity of the anatomical structure and biomechanics of the joint determines

the high incidence of TMJ dysfunction, the pathology of which often acts as a trigger or supporting factor in the development of other diseases [Balaji S.M., 2017; Bida A.V. et al. 2019; Lai Y.C. et al., 2020; He H., Liu Z.J., 2019].

Two groups of factors are considered as the main reasons for the development of disorders of the muscular-articular complex of the TMJ - occlusal-articulatory and psychogenic. Temporomandibular joint dysfunction has a multifactorial origin, while the vast majority of TMJ pathologies are functionally caused. The etiology of TMJ dysfunction is due to neuromuscular and occlusal-articulation disorders.

The neuromuscular syndrome is characterized by severe neuralgic pains of arthrogenic origin, myalgia, clicks in the joint, jerky, zigzag deviations with phenomena of glossalgia, glossodynia and bruxism [Kretschmer W.B. et al., 2019; McSwiney T.P. et al., 2017]. Often, the symptom complex is not fully manifested, but as a combination of individual symptoms and can be observed in the absence of x-ray changes in the joints and defects of the occlusal ratios of the dentition and jaws.

The most important role in the development of TMJ diseases is played by occlusion anomalies, which account for components from 34 to 87% in the structure of this pathology. Most authors believe that the development of tooth ratio anomalies is due to a lesser extent to the morphological features of the elements of the joint, to a greater extent - to changes in intra-articular relationships. Occlusion-induced changes in the articular surfaces and the TMJ capsule, as a rule, exacerbate age-related changes, which in turn leads to the emergence of anatomical prerequisites for the development of its dysfunction. [Tkachenko I.M. et al., 2019; Chatzopoulos G.S., Wolff L.F., 2020].

It has been established that in 70–89% of cases, TMJ pathology is not associated with inflammatory processes, but is a functional articular disorder caused by changes in soft tissue elements: disc, posterior disc zone, capsular-ligamentous apparatus, lateral pterygoid muscles. It should be noted that a clear relationship between TMJ pathology and occlusion disorders is not always observed. At the same time, it has been shown that the normalization of the closing of the teeth improves the physiological functioning of the articular elements. [Gil-Martinez A. et al., 2018].

Treatment of TMJ dysfunction is a time-consuming process. The most important role is played by the preparation of the patient himself, his mood for recovery. Of great importance in the ongoing treatment is the rehabilitation of the oral cavity, as well as the replacement of prostheses that interfere with the normal functioning of the joint. [Chatzopoulos G.S., Wolff L.F., 2020; Saeidi Pour R. et al., 2018]. The above cited determined the purpose of our work.

The aim of the study was to increase the effectiveness of orthopedic rehabilitation of patients with complete reconstruction of the dentition based on the individual anatomical, functional and clinical characteristics of the temporomandibular joint.

To achieve this goal, a single-center, open, prospective, non-randomized study

was conducted with the participation of 647 edentulous patients in need of complete dentition reconstruction. In the course of the study, we tested the concept of an interdisciplinary approach to the treatment of this group of patients that we developed. At the same time, during the implementation of diagnostic and therapeutic and rehabilitation measures, the data of an objective examination of patients were taken into account, including the central ratio, therapeutic position, individual hinge-orbital axis, occlusal plane, inclination of the central incisors, bite height.

The treatment was pathogenetically justified, since the application of the approach developed by us was also carried out on the basis of indicators that were obtained using a complex of diagnostic methods to assess the state of both the dentition and other body systems (respiratory, central nervous, cardiovascular, respiratory, musculoskeletal).

In recent decades, there have been more and more reports of the relationship of adentia with such pathological manifestations as orofacial pain, temporomandibular pathology (TMP), changes in occlusion, speech dysfunction, swallowing, chewing, bruxism, and aesthetic disorders. These characteristics should be taken into account when planning treatment and rehabilitation measures for this category of patients.

The orofacial pain is defined as "pain localized above the neck, in the anterior parotid area, below the orbit line, as well as pain in the oral cavity, including toothache, as well as pain caused by temporomandibular pathology" [Ohrbach R., Dworkin S.F., 2016]. In turn, GNP is defined as "conditions that contribute to incomplete or impaired function of the temporomandibular joint and / or masticatory muscles."

According to a number of authors, from 27 to 76% of patients who visit dentists complain of dysfunction of the TMJ, as well as pain in the neck, headaches, pain in the spine, myofascial pain. These patients often have manifestations of ENT pathology, the consequences of injuries, neurological disorders, and cosmetic problems.

In most cases, when planning a complex orthopedic rehabilitation, it is necessary to determine the central ratio of the jaws and the vertical bite size. To do this, it is important to assess the condition of the muscles of the maxillofacial area. In this regard, at the first stage of our study, we studied the severity of soreness of the muscles of the maxillofacial area and postural muscles.

The results of monitoring the condition of patients after the measures taken for dental orthopedic rehabilitation showed that in the group of patients where the proposed approach was used, there was a significant improvement in the results of palpation as the muscles of the maxillofacial area (m. masseter superficialis, m. masseter deep part, m. pterygoideus medialis, m. pterygoideus lateralis, m. temporalis anterior, m. temporalis medialis, m. temporalis posterior, m. mylohyoideus, m. digastricus, m. suprahyoidale, m. infrahyoidale), and postural muscles (m. omohyoideus, m sternocleidomastoideus).

In this case, the frequency of pain decreased by 1.9-3.3 times relative to the

corresponding indicators in the comparison group, where the standard complex of dental orthopedic treatment was used. A similar dynamic was revealed when assessing the condition of the muscles in the neck, shoulders and atlanto-occipital area.

It is known that the anatomical and functional features of the dentition that occur after the loss of teeth determine the choice of methods for treatment and rehabilitation measures using prostheses of various shapes, sizes and designs. At the same time, regardless of the purpose of treatment, specialists should make every effort to minimize the effects of established structures on the Condition of the central nervous system (CNS) of patients. Such influences can be caused, in particular, by defects of occlusal relationships that contribute to the manifestations of orofacial pain and temporomandibular pathology. [Baad-Hansen L., Benoliel R., 2017; Durham J. et al., 2015].

The implementation of complex treatment and rehabilitation measures, which for the patients has a significant reconstruction of the dentition in accordance with our proposed interdisciplinary approach, deterioration or lack of treatment results in relation to soreness of the muscles of the maxillofacial area, the frequency of pain in the TMJ, when chewing, opening and closing mouth, capturing lower (relative to the comparison group) levels of indicators of the impact of the analog scale for assessing pain.

Correct orthopedic treatment has an impact on TMJ dysfunction [Kretschmer W.B. et al., 2019]. A number of studies have confirmed the effectiveness of splint therapy in the treatment of pain syndrome with occlusive disorders of the TMJ in combination with orthopedic and physiotherapeutic methods. It has been shown that occlusal splints change the nature of the closure of teeth, affect the periodontium, masticatory muscles and TMJ [Hu J.L., Dong Y., 2019].

The use of splint therapy contributed to a decrease in masticatory muscle tone in 81.8% of patients, pain sensitivity in 85.7%. The author notes the presence of a positive result in 1-1.5 months from the moment of installation of repositioning splints.

At the same time, pain and clicking in the TMJ stopped in 83.3% of the subjects. Carrying out kinesitherapy made it possible to achieve pain relief in all patients after 7 days. Other researchers also emphasize the positive role of kinesitherapy in the treatment of this category of patients, since the use of such an approach to treatment is believed to have significantly reduced the severity of pain symptoms.

[Baad-Hansen L., Benoliel R., 2017].

An important element of the complex treatment of myofacial syndrome (MFS) is the methods of orthopedic treatment, the purpose of which is to eliminate malocclusion. At the same time, specialists have not developed a unanimous opinion regarding the forecast for the development of the MFS in the process of implementing these

activities.

Tecco S. et al. (2012) analyzed data from 91 Caucasian patients undergoing orthodontic treatment for various malocclusions. MFS was initially diagnosed in 37 patients. Of these, 30 patients (main group) underwent orthopedic treatment, after which a statistically significant decrease in the frequency of manifestations of TMJ pathology (in particular, crepitus, clicks) was observed. There was also a significant decrease in the severity of pain in the jaws, TMJ, facial muscles. At the same time, the authors noted a significant improvement in the quality of life of these patients.

Some patients showed signs of depression at the beginning of the follow-up, then there was a decrease in the manifestations of these symptoms, most patients reported an improvement in their subjective well-being based on the results of their subjective assessment, which was noted on a visual analogue scale (VAS) before and after treatment. Muscle palpation revealed a statistically significant decrease in the severity of pain (as assessed by VAS) in the area of the temporal muscle, sternocleidomastoid muscle, masticatory and cervical muscles

In the main group of patients after the treatment, there was a significant decrease in the number of patients with manifestations of pain at trigger points in the area of the temporal and masticatory muscles. Similar changes were also found for the patients with similar manifestations in the m. digastric and sternocleidomastoid muscles.

The aim of the study by Emodi Perelman A et al. (2015) compared the prevalence of pain in the cervical muscles The aim of the study by Emodi Perelman A et al. (2015) compared the prevalence of pain in the cervical muscles (CMP), as well as myogenic disorders in the TMJ area in female dentists, workers in a number of high-tech fields, as well as patients professionally employed in other fields of activity. The authors studied the relationship between the manifestations of MFS, TMJ pathology and bruxism, assessed the effect of stress on the severity of MFS and manifestations of

as well as myogenic disorders in the TMJ area in female dentists, workers in a number of high-tech fields, as well as patients professionally employed in other fields of activity. The authors studied the relationship between the manifestations of MFS, TMJ pathology and bruxism, assessed the effect of stress on the severity of MFS and manifestations of (CMP)

The assessment of these manifestations was carried out on the basis of the clinical symptoms of MFS and CMP, as well as the results of a questionnaire. Sleep bruxism was diagnosed using the approved diagnostic criteria of the American Academy of Sleep Medicine (International Classification of Sleep Disorders (ICSD-2), 2005, Westchester, Illinois), and awake bruxism was diagnosed based on a questionnaire.

The frequency of complications in the form of MFS with signs of CMP or bruxism (during sleep and/or wakefulness) was high, the odds ratio varied from 2.603 to 3.077. According to the authors, the data obtained indicated that dentists, as well as workers

in high-tech industries, are at a higher risk of developing TMJ pathology and myofascial pain syndromes compared to workers in other professions.

The researchers emphasize that the associations of the above clinical manifestations identified in this study indicate the importance of palpation of the cervical muscles, this element should become an obligatory part of the standard examination for suspected TMJ pathology.

Obviously, within the framework of a set of measures for the correction and restoration of the anatomical shape of the teeth, one of the key areas should be the relief of pain and the correction of the pathology of the TMJ, accompanied by dysfunction of the joint. In the course of solving the problems that specialists face when planning a complex of necessary medical and rehabilitation measures, it is necessary first of all to evaluate the manifestations of myofacial pain, which requires palpation of all muscle groups of the maxillofacial area during the examination.

At the same time, efforts should be made to identify causal relationships of pain in these areas with occlusion disorders and TMJ pathology.

The assessment of the occlusal index showed that the decrease in this indicator after the treatment was most expressed for the patients of the third group (C), where its value decreased by more than 2 times and was statistically significantly lower compared to group 1. The revealed trend continued with further observation for patients - the ratio of the values of the indicator was maintained after 5 and 7 years.

The established tendencies to improve the indicators of clinical examination of patients with adentia were confirmed by the results of instrumental studies. At the same time, normalization of occlusal relationships was also revealed: according to the occlusiogram, there was a decrease in the frequency of detection of the interdental position of the ICP, protrusion, left and right mediotrusion, as well as bruxism

The most important role in the development of TMJ diseases is played by occlusion anomalies, the detection rate of which is from 30 to 40% in the structure of this pathology. Most authors believe that the development of anomalies in the ratio of teeth is due to a lesser extent to the morphological features of the elements of the joint, to a greater extent - to changes in intra-articular relationships. [Baad-Hansen L., Benoliel R., 2017; Kretschmer W.B. et al.,2019].

The occlusion-induced changes in the articular surfaces and the TMJ capsule, as a rule, exacerbate age-related changes, which in turn leads to the emergence of anatomical prerequisites for the development of its dysfunction [Kretschmer W.B. et al., 2019]. It has been shown that chronic stress in the pathology of the TMJ manifests itself in the form of parafunctions and bruxism, which contributes to the feeling of "fatigue" of the masticatory muscles, pain during chewing and their spasm. The role of psychogenic factors in the development of the disease has also been demonstrated. [Baad-Hansen L., Benoliel R., 2017; Kretschmer W.B. et al., 2019].

Until recently, occlusion was considered as a static ratio of the occlusal surfaces of the jaw and teeth (natural or prostheses), as well as an implant or other orthopedic structures [Ferro K.J. et al., 2017]. During sleep, active tooth contact due to clenching and/or bruxism can be frequent and prolonged, and so teeth or dentures should be protected, such as a splint, to minimize bruxism and sleep apnea [Manfredini D. et al., 2017]. For the patients undergoing orthodontic, orthopedic or complex dental treatment, it is necessary to use clear treatment regimens [Abduo J. et al., 2013]. The goal of using such rehabilitation approaches is the correct position of the head of the TMJ and the height of the bite. [Moreno-Hay I., Okeson J.P., 2015].

The dentition is oriented in three planes (sagittal, cranial and frontal), which is physiologically justified [Porwal A., Sasaki K., 2013]. This anatomical position of the teeth allows for optimal chewing efficiency. In accordance with this, orthopedic structures are made that provide the correct ratio of the dentition and occlusion. [Sheridan R.A. et al., 2016.

In most cases, when planning a complex orthopedic rehabilitation, it is necessary to ensure the creation of certain mutually protective occlusal schemes by correcting the position of the jaws, in particular, by ensuring acceptable occlusal vertical dimensions.

The results of the study indicated an improvement in the state of the TMJ according to condylography, which was accompanied by a decrease in the frequency of detection of signs of protrusion-retrusion for the patients who, as part of planning measures for dental orthopedic rehabilitation, used an interdisciplinary approach, taking into account individual anatomical and physiological characteristics of the maxillofacial area. At the same time, the results of the X-ray examination made it possible to establish a decrease in the frequency of pathological signs - the presence of fluid and a change in the shape of the joint head, signs of arthrosis and arthritis of the TMJ, distal or ventral dislocation of the TMJ disk.

An increasing number of authors believe that the introduction of a set of diagnostic and treatment methods based on modern methodologies is important in the treatment of this category of patients [Milosevic A., 2020; Munoz Lora V.R. et al., 2019]. This was confirmed by the results of our study, which showed that the use of an integrated interdisciplinary approach to orthopedic rehabilitation contributes to the fact that for the patients who undergo a complete reconstruction of the dentition, 1-3 years after the start of treatment, there are statistically significantly lower (relative to the comparison group) levels of indicators of the visual analog scale for assessing pain sensations (by 27.5-46.0%), the frequency of registering a click in the TMJ (by 1.9-4.5 times), pain when chewing (8.2-11.2 times). Also, in the main group of patients, a higher frequency of improvement in the state of the TMJ according to condylography data was registered - 5.4-5.8 times compared with the corresponding indicator when using standard approaches to orthopedic rehabilitation and a higher self-assessment by

patients of the aesthetic results of treatment and rehabilitation measures - by 24.1-27.4% on the GAIS External Change Scale.

An analysis of the aesthetic characteristics of patients who underwent a complete restoration of the dentition showed that the use of the proposed approach to dental orthopedic rehabilitation in relation to the aesthetic characteristics of the face and dentoalveolar system of patients with adentia is more expressed compared to the corresponding values for the patients who undergo a standard complex of treatment and rehabilitation measures) by the dynamics of the parameters of the characteristics of the face (statistically significant decrease in the number of patients with vertical displacement of the smile line, smile symmetry disorders, displacement of the contour of the gums at the necks of the teeth), characteristics of the relationship between teeth and lips (statistically significant decrease in the number of patients with defects of the position of the incisors, canines, the number of patients with impaired pronunciation of sounds F and S, defects of the size of the buccal corridor, changes in the visualization of the central incisors from under the red border of the lips), dental analysis (a statistically significant decrease in the number of patients with defects of the location of the cutting edge relative to the occlusal plane, the number of patients with changes in the size of the upper central and lower central incisors, with defects of interdental proximal contacts, with the inclination of the lower incisors and defects of overlapping teeth).

The final stage of the work was devoted to the analysis of the results of applying the characteristics of interdisciplinary studies: normalization of indicators of obstructive sleep apnea syndrome (decrease in the apnea-hypopnea index, increase in the basal saturation index, decrease in the minimum saturation level, increase in the sleep efficiency index and increase in the proportion of patients with favorable sleep characteristics), more expressed (compared with the group of patients who underwent a standard set of treatment and rehabilitation measures) dynamics of a decrease in the indicators of all scales of the OHIP-14 questionnaire, indicating an improvement in the quality of life of patients, and a significant increase in the value of the GAIS scale, confirming a higher satisfaction of patients with changes in appearance in the result of the treatment.

It was found that one year after the start of treatment and rehabilitation measures in each group, a positive trend was observed in the form of a decrease in the average values of sleep characteristics, while the most expressed decrease in indicators was recorded for the patients who underwent dental orthopedic treatment using the developed interdisciplinary approach.

The obtained results confirmed that the use of the methodology of an interdisciplinary approach is a key factor in the high safety and clinical effectiveness of orthopedic treatment of patients in need of total restoration of the dentition.

Also, the obtained results indicated an increase in the level of dental quality of life for the patients of all three groups, while in group 3, where the method we proposed for managing patients in need of total restoration of the dentition was used, higher values of the scales of the OHIP-14 questionnaire “Problems with eating", "Problems in communication", "Problems in everyday life", as well as the overall indicator of this questionnaire.

A statistically significantly higher satisfaction of patients with the treatment and rehabilitation measures was also noted - the increase in the level of the GAIS scale was maximum in the group where the complex approach to rehabilitation proposed by us was used.

As part of a comprehensive interdisciplinary approach to the diagnosis and treatment of patients with adentia, it is necessary to use methods confirmed by an appropriate evidence base in order to verify the prevalence of pain neuromuscular or occlusive-articular syndromes, as well as to assess their systemic impact on the biomechanical relationships of all elements of the maxillofacial system.

The need to use an interdisciplinary approach to dental treatment of this group of patients involves, first of all, a thorough comprehensive examination of patients with orofacial pain [Chikunov S.O., 2013]. In this regard, it is necessary to assess the state of the TMJ using the methods of cone beam computed tomography, Doppler ultrasound, and magnetic resonance imaging. It should be taken into account that despite the fact that these methods have good sensitivity, at the same time their specificity is relatively low in relation to the long-term prognosis of the development of temporomandibular pathology. [Bakke M. et al., 2014].

To assess the manifestations of TMP, it is proposed to use other methods - X-ray, laboratory, in particular, the determination of C-reactive protein, interleukin-6, rheumatoid factor, antinuclear antibodies. It is also proposed to assess the quality of sleep and the severity of manifestations of obstructive sleep apnea syndrome using appropriate questionnaires [Chung F. et al., 2012]. Local muscle soreness should also be assessed, for which myofascial trigger points are used, as well as the severity of centrally mediated myositis, although methods such as electromyography are characterized by relatively low specificity [Al-Salleh M.A. et al., 2012].

Specialists should provide a favorable atmosphere for ongoing dental treatment, during which the diagnosis and features of ongoing treatment and rehabilitation measures should be taken into account: acute pain therapy, elimination of aberrant nociceptive effects on the central nervous system, the sources of which may be changes in tooth occlusion, the presence of orthopedic structures.

In recent years, there have been great achievements in the development of technologies for dental orthopedic care, including in relation to the treatment of orofacial pain, temporomandibular pathology and occlusion disorders in the process of

orthodontic, orthopedic and complex interdisciplinary treatment. This approach has become a practical reality in today's integrative healthcare.

The multifactorial nature of the problem largely determines the structure of the necessary diagnostic and therapeutic measures when planning dental and orthopedic treatment and rehabilitation of patients. We believe that the most effective in solving the problem considered in the framework of this work is an interdisciplinary approach with the participation of dentists, otolaryngologists, neurologists, kinesiologists, osteopaths, cosmetologists, psychologists. It is necessary to interact with doctors of different specialties in order to comprehensively assess the clinical situation and further improve the algorithms for diagnosing and treating patients with adentia who need a complete reconstruction of the dentition.

CONCLUSIONS

1. When examining patients with adentia who need a complete reconstruction of the dentition, the following pathological changes in the dentition are revealed: pain on palpation of the muscles of the maxillofacial area, signs of pathology of the temporomandibular joint (according to condylography and computed tomography), defects of occlusal relationships and retrusion stability, as well as aesthetic disorders of the maxillofacial area.

2. For the patients with adentia who need a complete reconstruction of the dentition, along with pathological changes in the dentoalveolar system, signs of concomitant disorders are revealed, which are characterized by complaints of headaches, pain on palpation of the posture muscles, muscles of the neck, shoulder girdle and atlanto-occipital area, disorders sleep (snoring, bruxism, obstructive sleep apnea syndrome) and a decrease in the quality of life.

3. The concept of an interdisciplinary approach to the treatment of patients with adentia who need a complete reconstruction of the dentition is based on the presence of causal relationships of anatomical and physiological features and pathological changes in the dentoalveolar system with signs of concomitant pathology, which must be taken into account when planning orthopedic and orthodontic treatment.

4. The clinical effectiveness of the proposed interdisciplinary approach to the implementation of dental orthopedic rehabilitation measures is manifested for the patients who undergo a complete reconstruction of the dentition, a statistically significant decrease in indicators characterizing pain on palpation of the muscles of the maxillofacial area, posture muscles, pain on palpation in the neck, shoulders and atlanto-occipital area (2.3-4.4 times more often than in the group of patients who undergo a standard set of dental orthopedic measures).

5. Normalization of occlusion characteristics using the developed approach is manifested for the patients with adentia by a more expressed (relative to the corresponding values in the comparison group) decrease in the occlusal index - by 2.1 times, a decrease in the frequency of ICP manifestations - by 2.1-4.3 times, protrusions - 12.2-22.3 times, left mediotrusion - 3.2-4.3 times, right mediotrusion - 3.8-4.4 times, bruxism - 4.8-5.2 times.

6. Improvement of the state of the temporomandibular joint in the implementation of an interdisciplinary approach to the implementation of dental orthopedic rehabilitation measures is manifested by statistically significant (relative to the characteristics of the comparison group) changes in indicators: a decrease in the dynamics of pain in the joint area according to the visual analog scale, a decrease in the frequency of manifestations of a click in the joint, the frequency of pain when chewing, pain when opening the mouth, pain and spasms in the neck, normalization of condylography indicators, Improvement of radiographic indicators of the state of the temporomandibular joint (reduction in the frequency of detection of fluid and changes in the shape of the joint head, signs of arthrosis and arthritis, distal or ventral dislocation of the joint disc), condylography, retrusion stability and electromyography.

7. The effectiveness of the proposed approach to dental orthopedic rehabilitation in relation to the aesthetic characteristics of the face and dentoalveolar system of patients with adentia is manifested by a more expressed (relative to the corresponding values in the group of patients who undergo a standard set of therapeutic and rehabilitation measures) dynamics of the following groups of indicators: facial characteristics (statistically significant decrease in the number of patients with vertical displacement of the smile line, defects of the symmetry of the smile, displacement of the gum contour at the necks of the teeth), characteristics of the relationship between teeth and lips (statistically significant decrease in the number of patients with defects of the position of the incisors, canines, the number of patients with impaired pronunciation of sounds F and S, defects of the size of the buccal corridor, changes in the visualization of the central incisors from under the red border of the lips), dental analysis (statistically significant decrease in the number of patients with defects of the location of the cutting edge relative to the occlusal plane, the number of patients with changes in the size of the upper central and lower central incisors, with defects of interdental proximal contacts, with the inclination of the lower incisors and defects of the overlap of the teeth).

8. The clinical effectiveness of the proposed approach to the implementation of dental orthopedic rehabilitation measures is manifested by the positive dynamics of the characteristics of interdisciplinary studies: the normalization of indicators of obstructive sleep apnea syndrome (a decrease in the apnea-hypopnea index, an increase in the basal saturation index, a decrease in the minimum saturation level, an increase

in the sleep efficiency index and an increase in the proportion patients with favorable sleep characteristics), more expressed (compared with the group of patients who underwent a standard complex of treatment and rehabilitation measures) dynamics of the decrease in the indicators of all scales of the OHIP-14 questionnaire, indicating an improvement in the quality of life of patients, and a significant increase in the value of the GAIS scale, confirming higher patient satisfaction with changes appearance as a result of the treatment.

9. The positive effects that are observed after applying an interdisciplinary approach to dental orthopedic rehabilitation measures for the patients with adentia who undergo a complete reconstruction of the dentition are persistent - their preservation was noted throughout the entire observation period for 5-7 years.

PRACTICAL RECOMMENDATIONS

1. Performing a total rehabilitation of the dentition for the patients with adentia is recommended to be carried out using an interdisciplinary approach based on taking into account the functional and anatomical features of the structure of the dentoalveolar system
2. During the diagnostic stage, within the framework of the implementation of an interdisciplinary approach, before the start of orthopedic and orthodontic treatment, a comprehensive diagnosis and treatment planning should be carried out, taking into account the need to adjust the functions of the body systems, changes in which affect the bite characteristics.
3. Diagnostics, which is carried out in the process of implementing an interdisciplinary approach before the start of orthopedic and orthodontic treatment, should include the following steps:

A) Clinical examination: clarification of complaints, anamnesis, filling out a dental questionnaire and a questionnaire to identify apnea, performing palpation of the muscles of the maxillofacial area.

B) Fullfiment of the instrumental studies: development of diagnostic models, teleroentgenogram in direct and lateral projections, MRI of the TMJ, CT or cone-beam computed tomography, condylography, brooks checker analysis, 3D scanning of digital models, 3D printing of models, 3D face scanning, digital modeling, photometric analysis, video recording of speech, scanning and photography of the face, cephalometric analysis, chewing tests, electromyography.

C) Evaluation of aesthetic characteristics: facial parameters, indicators of gingival and labial aesthetics, analysis of the shape, position, size, color of teeth, their proportions and symmetry relative to each other and facial components.

D) Fullfiment of the interdisciplinary studies: assessment of the state of the musculoskeletal system, assessment of neurological status, polysomnological examination of the patient (identification of signs of OSA), electroencephalography, consultations with an otorhinolaryngologist, neuropathologist, speech therapist, psychologist.

4. As the next steps in the implementation of the proposed algorithm, it is advisable to perform:

- choice of material for restorations;
- based on the results of a comprehensive clinical functional and instrumental analysis, the determination of the central ratio of the jaws when casting models into an articulator;
- if pathologies of the respiratory and / or musculoskeletal system that affect the bite are detected, therapeutic measures should be taken to correct these pathologies together with other specialists.

REFERENCES

1. Abdelhamid A., Omran M., Bakhshalian N. et al. An open randomized controlled clinical trial to evaluate ridge preservation and repair using SocketKA P(TM) and SocketKAGE(TM): part 2 - three-dimensional alveolar bone volumetric analysis of CBCT imaging // Clin. Oral Implants Res. – 2016. – Vol.27 (6). – P.631-639.
2. . Abduo J., Tennant M., McGeachie J. Lateral occlusion schemes in natural and minimally restored permanent dentition: a systematic review // J. Oral Rehabilitation. - 2013. - Vol. 40. - P. 788–802.
3. Abu-Raisi S.S., Ibrahim S.A., Ajina M.A. et al. Temporomandibular Disorder among Women Who Experienced Posttraumatic Stress Disorder after a Miscarriage // J. Int. Soc. Prev. Community Dent. - 2019. - Vol. 9 (5). - P.445– 452.
4. Academy of Prosthodontics. The glossary of prosthodontic terms // J. Prosthet. Dent. – 2005. – Vol. 94. – P. 90-92.
5. Afrashtehfar K.I., Qadeer S. Computerized occlusal analysis as an alternative occlusal indicator // Cranio. - 2014. - Vol.16. - P. 215.
6. Ahn S.J., Baek S.H., Kim T.W., Nahm D.S. Discrimination of internal derangement of temporomandibular joint by lateral cephalometric analysis // Am. J. Orthod. Dentofac. Orthop. Off. Publ. Am. Assoc. Orthod. Its Const. Soc. Am. Board Orthod. - 2006. - Vol.130 (3.) - P. 331–339.
7. Akagi R., Yamashita Y., Ueyasu Y. Age-related differences in muscle shear moduli in the lower extremity // Ultrasound Med. Biol. - 2015. - Vol.41. - P. 2906–2912.
8. Al-Ekrish A.A. Effect of exposure time on the accuracy and reliability of cone beam computed tomography in the assessment of dental implant site dimensions in dry skulls // Saudi Dent. J. – 2012. – Vol.24 (3-4). – P.127-134.
9. Aliaga I.J., Vera V., Paz J. Et al. Modelling the Longevity of Dental Restorations by means of a CBR System // BioMed Research International. – 2015. - Art. ID 540306.- 10 p.
10. Al-Salleh M.A., Armijo-Olivo S., Flores-Mir C., Thie N.M. Electromyography in diagnosing temporomandibular disorders // The Journal of the American Dental Association. - 2012. - Vol.143. - P.351-362.
11. Arisan V., Karabuda Z., Arici S.V. et al. A randomized clinical trial of an adjunct diode laser application for the nonsurgical treatment of peri-implantitis // Photomed Laser Surg. – 2015. – Vol.33 (11). – P.547-55Armalaite J., Jarutiene M., Vasiliauskas A. et al. Smile aesthetics as perceived by dental students: a cross-sectional study // BMC Oral Health. - 2018. - Vol. 18(1). - P.225

12. Armijo-Olivo S., Gadotti I., Kornerup M. et al. Quality of reporting masticatory muscle electromyography in 2004: a systematic review // J. Oral Rehabil. - 2007. - Vol.34 (6). - P.397–405.

13. Arnhart C., Kielbassa A.M., Martinez-de Fuentes R. et al. Comparison of variable-thread tapered implant designs to a standard tapered implant design after immediate loading. A 3-year multicentre randomized controlled trial // Eur J. Oral Implantol. - 2012. - Vol. 5 (2). - P.123 -136.

14. Asa'ad F., Pagni G., Pilipchuk S.P. et al. 3D-Printed Scaffolds and Biomaterials: Review of Alveolar Bone Augmentation and Periodontal Regeneration Applications // Int. J. Dent. - 2016; 2016:1239842. Epub. 2016. Jun. 5.

15. Baad-Hansen L., Benoliel R. Neuropathic orofacial pain: facts and fiction // Cephalalgia. - 2017. - Vol.37.- P. 670–679.

16. Babbush C.A., Kanawati A., Brokloff J. A new approach to the All- on-Four treatment concept using narrow platform NobelActive implants // J. Oral. Implantol. - 2013. – Vol.39 (3). – P.314-325.

17. Bakke M., Petersson A., Wiesel M. et al. Bony dethroughtions revealed by cone beam computed tomography of the temporomandibular joint in subjects without ongoing pain // Journal of Oral & Facial Pain and Headache. - 2014. - Vol. 28. - P. 331–337.

18. Balaji S.M. Bilateral pediatric mandibular distraction for micrognathia with temporomandibular joint ankylosis and sleep apnea // Indian J Dent Res. - 2017. - Vol.28(5). - P.588-591.

19. Barbero M., Flores-Mir C., Blanco J.C. et al. Tridimensional upper airway assessment in male patients with OSA using oral advancement devices modifying their vertical dimension // J. Clin. Sleep. Med. - 2020. - Jul 6. doi: Prevalence of dental anomalies in French orthodontic patients: A retrospective study // Arch Pediatr. - 2018, - Vol.25(7). - P.426-430.

20. Beddis H., Pemberton M., Davies S. Sleep bruxism: an overview for clinicians // Br Dent J. - 2018. - Vol.225(6). - P.497-501.

21. Belibasakis G.N., Charalampakis G., Bostanci N., Stadlinger B. Peri-implant infections of oral biofilm etiology // Adv. Exp. Med. Biol. - 2015. – Vol.830. – P.69-84.

22. Benlidayi M.E., Gaggl A., Borger H. et al. Comparative study of the osseointegration of dental implants after different bone augmentation techniques: vascularized femur flap, non-vascularized femur graft and mandibular bone graft // Clin. Oral. Implants Res. - 2011. – Vol.22 (6). – P.594-599.

23. Bergamini M., Pierleoni F., Gizdulich A., Bergamini C. Dental occlusion and body posture: a surface EMG study // Cranio. – 2008. – Vol. 26 (1). – P. 25-32.

24. Berni K.C., Dibai-Filho A.V., Pires P.F., Rodrigues-Bigaton D.Accuracy of the surface electromyography RMS processing for the diagnosis of

25. Bhamrah G., Dhir A., Cash A. et al. Patient's experience of treatment for sleep apnoea with a mandibular advancement splint // Surgeon. - 2014. - Jun 14. [Epub ahead of print].

26. Bornstein M.M., Brugger O.E., Janner S.F. et al. Indications and Frequency for the Use of Cone Beam Computed Tomography for Implant

27. Bouazza-Juanes K., Martinez-Gonzalez A., Peirc G. et al. Effect of platform switching on the peri-implant bone: A finite element study // J. Clin. Exp. Dent. - 2015. – Vol.7 (4). – P.483-488.

28. Brunzini A., Gracco A., Mazzoli A. et al. Preliminary simulation model toward the study of the effects caused by different mandibular advancement devices in OSAS treatment // Comput Methods Biomech Biomed Engin. - 2018. - V ol.27:1-10.

29. Canut Brusola J.A. Aparato estomatognático: diseño biomecánico. In: Canut Brusola J.A., eds. Ortodoncia Clínica Y Terapéutica, 2nd ed. – Barcelona: Masson S.A., 2005. – P. 17-24.

30. Caprioglio A., Levrini L., Nosetti L. et al. Prevalence of malocclusion

31. Casap N., Wexler A., Lustmann J. Image-guided navigation system for placing dental implants // Compendium. – 2004. – Vol..25, No 10. – P.783-789.

32. Chatzopoulos G.S., Wolff L.F. Symptoms of temporomandibular disorder, self-reported bruxism, and the risk of implant failure: A retrospective

33. Chen J., Zhang Z., Chen X. et al. Design and manufacture of customized dental implants by using reverse engineering and selective laser melting technology // J. Prosthet. Dent. – 2014. – Vol.112 (5). – P.1088-1095

34. . Choi Y.Y. Relationship between orthodontic treatment and dental caries: results from a national survey // Int. Dent. J. - 2019. - Aug 23. doi: 10.1111/idj.12515. [Epub ahead of print]

35. Chung F., Subramanyam R., Liao P. et al. High stop bang score indicates a high probability of obstructive sleep apnoea // British Journal of Anaesthesia. - 2012. - Vol. 108. - P. 768–775.

36. Chung S.H., Kim H.K., Shon W.J. et al. Peri-implant bone formations around (Ti,Zr)O(2) -coated zirconia implants with different surface roughness // J. Clin. Periodontol. - 2013. – Vol.40 (4). – P.404-411.

37. Clark G.T., Browne P.A., Nakano M., Yang Q. Coactivation of sternocleidomastoid muscles during maximum clenching // J. Dent. Res. – 1993. – Vol. 72 (11). – P. 1499-1502.

38. Cohen-Levy J., Petelle B., Vieille E. et al. Changes in facial profile after maxillomandibular advancement surgery for obstructive sleep apnea syndrome // Int. Orthod. – 2013. – Vol.11 (1). – P.71-92.

39. Cohen-Levy J., Patelle B., Pinguet J. et al. Forces created by mandibular advancement devices in OSAS patients: a pilot study during sleep // Sleep Breath. - 2013. – Vol.17 (2). – P.781-789.

40. Consolaro A., Romano F.L. Reasons for mini-implants failure: choosing installation site should be valued! // Dental Press J. Orthod. – 2014. – Vol.19 (2). – P.18-24.

41. Dalago H.R., Schuldt Filho G., Rodrigues M.A. et al. Risk indicators for Peri-implantitis. A cross-sectional study with 916 implants // Clin. Oral Implants Res. – 2016. - Jan 11. doi: 10.1111/clr.12772. [Epub ahead of print].

42. de Lira M.R., de Oliveira A.S., França R.A. et al. Multiple diagnoses, increased kinesiophobia? - Patients with high kinesiophobia levels showed a greater number of temporomandibular disorder diagnoses // Musculoskelet. Sci. Pract. - 2019. - Vol.44. - P. 102054.

43. Demirovic K., Habibovic J., Dzemidzic V. et al. Comparison of Oral Health-Related Quality of Life in Treated and Non-Treated Orthodontic Patients // Med Arch. – 2019. – No 73 (2). – P. 113–117.

44. de Oliveira R.H., Hallak J.E., Siessere S. et al. Electromyographic analysis of masseter and temporal muscles, bite force, masticatory efficiency in medicated individuals with schizophrenia and mood disorders compared with healthy controls // J. Oral. Rehabil. – 2014. – Vol. 41 (6). – P. 399-408.

45. Derks J., Schaller D., Hekansson J. et al. Effectiveness of Implant Therapy Analyzed in a Swedish Population: Prevalence of Peri-implantitis // J. Dent Res. - 2016. – Vol.95 (1). – P.43-49.

46. De Souza Carvalho A.C., Magro Filho O., Garcia I.R. et al. Cephalometric and three-dimensional assessment of superior posterior airway

47. Dhima M., Rieck K.L., Arce K., Salinas T.J. Development of stable peri-implant soft tissue and mentolabial sulcus depth with an implant-retained soft tissue conformer after osteocutaneous flap reconstruction // Int. J. Prosthodont. - 2013. – Vol.26 (3). – P.265-267.

48. Di Francesco R., Monteiro R., Paulo M. et al. Craniofacial morphology and sleep apnea in children with obstructed upper airways: differences between genders // Sleep Med. – 2012. – Vol.13 (6). – P.616-620.

49. Di Lallo S., Ricci L., Orecchioni S. et al. Resonance Frequency Analysis Assessment of Implants Placed with a Simultaneous or a Delayed Approach in Grafted and Nongrafted Sinus Sites: A 12-Month Clinical Study // Clin. Implant Dent. Relat. Res. - 2014. –Vol.16 (3). – P.394-400.

50. Dohan Ehrenfest D.M., Rutkowski J.L. Evolution of the dental implant market: An African tale revisited // J. Oral. Implantol. – 2012. – Vol. 38 (3). – P.201-202.

51. Durham J., Raphael K.G., Benoliel R. et al. Perspectives on next steps in classifification of oro-facial pain – part 2: role of psychosocial factors // Journal of Oral Rehabilitation. - 2015. - Vol. 42. - P. 942–955.

52. Duttenhoefer F., Souren C., Menne D. et al. Long-term survival of dental implants placed in the grafted maxillary sinus: systematic review and meta-analysis of treatment modalities // PLoS One. - 2013. - Vol.18 (9). - P.75357.

53. Eby S.F., Cloud B.A., Brandenburg J.E. et al. Shear wave elastography of passive skeletal muscle stiffffness: inflfluences of sex and age throughout adulthood // Clin. Biomech. - 2012. - Vol.30. - P.22–27.

54. Emodi Perelman A., Eli I., Rubin P.F. et al. Occupation as a potential contributing factor for temporomandibular disorders, bruxism, and pain: a controlled comparative study // European Journal of Oral Sciences. - 2015. - Vol. 123(5). - P.356–361.

55. Eriksson P.O., Zafar H., Nordh E. Concomitant mandibular and headneck movements during jaw opening-closing in man // J. Oral Rehabil. – 1998. – Vol. 25 (11). – P. 859-870.

56. Esposito M. The bright and dark sides of evidence-based implantology // Eur. J. Oral. Implantol. – 2013. – Vol.6 (2). – P.103.

57. Feller L., Khammissa R.A., Meyerov R., Lemmer J. Peri-implant mucositis and peri-implantitis: commentary // SADJ. - 2012. - Vol. 67, No 3. - P. 128–129.

58. Ferro K.J., Morgano S.M., Driscoll C.F. et al. Knoerne glossary of prosthodontic terms. Ninth edition // Journal of Prosthetic Dentistry. - 2017. - Vol. 117(5). - P. 1–105.

59. Flores-Mir C., Korayem M., Heo G. et al. Craniofacial morphological characteristics in children with obstructive sleep apnea syndrome: a systematic review and meta-analysis // J. Am. Dent. Assoc. – 2013. – Vol.144 (3). – P.269- 277.

60. Froum S.J., Rosen P. A proposed classification for peri-implantitis // Int. J. Periodontics Restorative Dent. – 2012. – Vol. 32(5). – P.533–5540

61. Furlan R.M. The use of superficial heat for treatment of temporomandibular disorders: an integrative review // Codas. – 2015. – Vol. 27 (2). – P. 207-212.

62. Gadotti I.C., Berzin F., Biasotto-Gonzalez D. Preliminary rapport on head posture and muscle activity in subjects with class I and II // J. Oral Rehabil. – 2005. – Vol. 32 (11). – P. 794-799.

63. Garber D.A., Goldstein R.E., Feinman R.A. Porcelain Laminate Veneers / D.A. Garber, R. E. Goldstein, R. A. Feinman. - NY.: Quintessence Pub Co., 1988. - 136 p.

64. Garreau E., Wojcik T., Bouscaillou J. et al. Comparative effectiveness of maxillomandibular advancement surgery versus mandibular advancement device for patients with moderate or severe obstructive sleep apnoea // Orthod. Fr. – 2014. – Vol.85 (2). – P.163-173.

65. Ghurye S. McMillan R Orofacial pain: an update on diagnosis and Better Function through Combining Orthodontics and Restorative Dentistry in the Case of Dental Abrasions // Case Rep Dent. - 2019; 2019:8137585. doi: 10.1155/2019/8137585.

66. Giannakopoulos N.N., Hellmann D., Schmitter M. et al. Neuromuscular interaction of jaw and neck muscles during jaw clenching // J. Orofac. Pain. – 2013. – Vol. 27 (1). – P. 61-71.

67. Giannakopoulos N.N., Schindler H.J., Hellmann D. Co-contraction behaviour of masticatory and neck muscles during tooth grinding // J. Oral Rehabil. – 2018. – Vol. 45 (7). – P. 504-511.

68. Giannakopoulos N.N., Schindler HJ., Rammelsberg P. et al. Co-activation of jaw and neck muscles during submaximum clenching in the supine position // Arch. Oral Biol. – 2013. – Vol. 58 (12). – P. 1751-1760.

69. Green L., Hondrum S. The effect of design modifications on the torsional and compres- sive rigidity of U-shaped palatal major connectors. // J. Prosth. Dent. – 2003. – Vol.89. – P. 400-407.

70. Gunson M.J., Arnett G.W., Formby B. et al. Oral contraceptive pill use and abnormal menstrual cycles in women with severe condylar resorption: A case for low serum 17beta-estradiol as a major factor in progressive condylar resorption // Am. J. Orthod. Dentofacial. Orthop. – 2009. – Vol. 136. – P.772.

71. Häggman-Henrikson B., Nordh E., Eriksson P.O. Increased sternocleidomastoid, but not trapezius, muscle activity in response to increased chewing load // Eur. J. Oral Sci. – 2013. – Vol. 121 (5). – P. 443-449.

72. Hanaoka M., Gehrke S., Mardegan F. et al. Influence of implant/abutment connection on stress distribution to implant-surrounding bone: a finite element analysis // J. Prosthodont. – 2014. – Vol.23 (7). – P.565-571.

73. Heidsieck D.S., Koolstra J.H., de Ruiter M.H. et al. Biomechanical effects of a mandibular advancement device on the temporomandibular joint // J Craniomaxillofac Surg. - 2018. - Vol.46(2). - P.288-292.

74. Hellmann D., Giannakopoulos N.N., Schmitter M. et al. Anterior and posterior neck muscle activation during a variety of biting tasks // Eur. J. Oral Sci. – 2012. – Vol. 120 (4). – P. 326-334.

75. Herpich C.M., Amaral A.P., Leal-Junior E.C. et al. Analysis of laser therapy and assessment methods in the rehabilitation of temporomandibular disorder:

a systematic review of the literature // J. Phys. Ther. Sci. - 2015. - Vol.27 (1). - P. 295–301.

76. Herpich C.M., Leal-Junior E.C., Gomes C.A. et al. Immediate and short-term effects of phototherapy on pain, muscle activity, and joint mobility in women with temporomandibular disorder: a randomized, double-blind, placebo- controlled, clinical trial // Disabil. Rehabil. - 2018. - Vol.40 (19). - P. 2318–2324.

77. Herrero Babiloni A., Lam J.T., Exposto F.G. et al. Interprofessional Collaboration in Dentistry: Role of physiotherapists to improve care and outcomes for chronic pain conditions and sleep disorders // Oral Pathol Med. - 2020. - Jun 12. doi: 10.1111/jop.13068. Online ahead of print.

78. Holmes J.D., Aponte-Wesson R. Dental implants after reconstruction with free tissue transfer // Oral Maxillofac. Surg. Clin. North Am. – 2010. – Vol.22 (3). – P.407-418.

79. Honda K., Larheim T.A., Maruhashi K. et al. Osseous abnormalities of the mandibular condyle: diagnostic reliability of cone beam computed tomography compared with helical computed tomography based on an autopsy material // Dento Maxillo Facial Radiol. - 2006. - Vol. 35 (3). - P. 152–157.

80. Horwitz J., Machtei E.E. Immediate and delayed restoration of dental implants in patients with a history of periodontitis: A prospective evaluation up to 5 years // Int. J. Oral. Maxillofac. Implants. - 2012. - Vol. 27 (5). - P. 1137-1143.

81. Horwitz J., Gabay E. Root resection in the era of dental implants // Refuat. Hapeh. Vehashinayim. - 2012. - Vol. 29 (1). - P.7-14.

82. Horzeler M.B., Von Mohrenschildt S., Zuhr O. Stage-two implant surgery in the esthetic zone: a new technique // Int. J. Periodontics Restorative Dent. – 2010. – Vol.30 (2). – P.187-193.

83. Hu J.L., Dong Y. Research progress in occlusal splint therapy for disorders // Zhonghua Kou Qiang Yi Xue Za Zhi. – 2019. – Vol. 54 (4). – P. 273- 277.

84. Huang D.L., Park M. Socioeconomic and racial/ethnic oral health disparities among US older adults: oral health quality of life and dentition // J. Public Health Dent. - 2015. - Vol.75(2). - P.85–92.

85. Huumonen S., Sipilä K., Haikola B. et al. Influence of edentulousness on gonial angle, ramus and condylar height // J. Oral Rehabil. - 2010. - Vol.37 (1). - P. 34–38.

86. Huynh N.T., Morton P.D., Rompre P.H. et al. Associations between sleep-disordered breathing symptoms and facial and dental morphometry, assessed with screening examinations // Am. J. Orthod. Dentofacial Orthop. – 2011. – Vol.140. – P.762–770.

87. Jati A.S., Furquim L.Z., Consolaro A. Gingival recession: its causes and types, and the importance of orthodontic treatment // Dental Press Journal Orthodontics, Maringá. - 2016. - Vol. 21, No3. - P. 18-29.

88. Javed F., Romanos G.E. Role of implant diameter on long-term survival of dental implants placed in posterior maxilla: a systematic review // Clin. Oral Investig. – 2015. – Vol.19 (1). – P.1-10.

89. Joda T., Gallucci G.O. The virtual patient in dental medicine // Clin. Oral Implants Res. – 2015. – Vol.26 (6). – P.725-726.

90. Julia-Sanchez S., Alvarez-Herms J., Cirer-Sastre R. et al. The Influence of Dental Occlusion on Dynamic Balance and Muscular Tone // Front. Physiol. – 2020. – Vol. 10. – P. 1626. [eCollection 2019].

91. Jung M.H. An evaluation of self-esteem and quality of life in orthodontic patients: Effects of crowding and protrusion // Angle Orthod. - 2014. - Dec 31. doi: 10.2319/091814-662.1

92. Kalra M., Aparna I.N., Dhanasekar B. Evolution of surgical guidance in implant dentistry // Dent. Update. – 2013. – Vol.40 (7). - P.577-581.

93. Katyal V., Pamula Y., Daynes C. et al. Craniofacial and upper airway morphology in pediatric sleep-disordered breathing and changes in quality of life with rapid maxillary expansion // Am. J. Orthod. Dentofacial. Orthop. – 2013. – Vol.144 (6). – P.860-871.

94. Kim J.H., Kim S.G., Lim S.C. et al. Histomorphometric analysis of bone formation in bony defects around implants in adult dogs: a comparison of grafts of low and high heat-treated autogenous tooth ash // Implant Dent. – 2013. – Vol.22 (6). – P.639-644.

95. Kobayashi T., Izumi N., Kojima T. et al. Progressive condylar

96. Koyama J., Nishiyama H., Hayashi T. Follow-up study of condylar bony changes using helical computed tomography in patients with temporomandibular disorder // Dento Maxillo Facial Radiol. - 2007.- Vol. 36 (8). - P. 472–477.

97. Kretschmer W.B., Baciuţ G., Baciuţ M., Sader R. Effect of bimaxillary orthognathic surgery on dysfunction temporomandibular joint: a retrospective study of 500 consecutive cases // British Journal of Oral and Maxillofacial Surgery. - 2019. - Vol. 57 (8). - P. 734–739.

98. Lai Y.C., Yap A.U., Turp J.C. Prevalence of temporomandibular disorders in patients seeking orthodontic treatment: A systematic review // J. Oral Rehabil. - 2020. -Vol. 47 (2). - P.270-280.

99. Larheim T.A., Abrahamsson A.K., Kristensen M., Arvidsson L.Z. Temporomandibular joint diagnostics using CBCT // Dentomaxillofacial Radiol. - 2014. - Vol. 44 (1). - P.20140235

100. Lascala C.A., Panella J., Marques M.M. Analysis of the accuracy of linear measurements obtained by cone beam computed tomography (CBCT- NewTom) // Dento Maxillo Facial Radiol. - 2004. - Vol. 33 (5). - P.291–294.

101. Laurell L., Lundgren D. Marginal bone level changes at dental implants after 5 years in function: a meta-analysis // Clin. Implant Dent. Relat. Res. - 2011. - Vol. 13 (1). - P. 19-28.

102. Lauriti L., Silva P.F., Politti F. et al. Pattern of electromyographic activity in mastication muscles of adolescents with temporomandibular disorder // J. Phys. Ther. Sci. - 2013. - Vol.25 (10). - P.1303–1307.

103. Lee Y.H., Lee K.M., Auh Q.S., Hong J.P. Sex-related differences in symptoms of temporomandibular disorders and structural changes in the lateral pterygoid muscle after whiplash injury // J. Oral Rehabil. - 2019a. - Vol.46 (12). - P.1107–1120.

104. Lekerud A.K., Sand L., Englund A.K., Hirsch J.M. Treatment of sleep apnoea using a mandibular advancement splint- an open prospective study // In Vivo. – 2012. – Vol.26 (5). – P.841-845.

105. Leung Y.Y., Lai K.K. Management of obstructive sleep apnoea: an update on the role of distraction osteogenesis // Curr Opin Otolaryngol Head Neck Surg. - 2018. - Vol.26(4). - P.214-220.

106. Li R., Mei L., Wang P. et al. Canine edge width and height affect dental esthetics in maxillary canine substitution treatment // Prog Orthod. - 2019. - V ol.20(1):16.

107. Lin H.Y., Su P.L., Lin C.Y., Hung C.H. Models of anatomically based oropharyngeal rehabilitation with a multilevel approach for patients with obstructive sleep apnea: a meta-synthesis and meta-analysis // Sleep Breath. - 2019. - Dec 14. doi: 10.1007/s11325-019-01971-8.

108. List T., Jensen R.H. Temporomandibular disorders: Old ideas and new concepts // Cephalalgia. - 2017. - Vol. 37 (7). - P. 692–704.

109. Luangchana P., Pornprasertsuk-Damrongsri S., Kiattavorncharoen S., Jirajariyavej B. Accuracy of linear measurements using cone beam computed tomography and panoramic radiography in dental implant treatment planning // Int. J. Oral Maxillofac. Implants. – 2015. – Vol.30 (6). – P.1287-1294.

110. . Manfredini D., Serra-Negra J., Carboncini F., Lobbezoo F. Current Assessment of type of bite and vertical dimension of occlusion in children and concepts of bruxism // The International Journal of Prosthodontics. - 2017. - Vol.30. - P. 437–438.

111. Matsuo Y., Kaito T., Iwasaki M. et al. Characteristics of maxillofacial morphology of Angle Class II patients with temporomandibular disorders involving crepitus // Orthod. Waves. - 2016. - Vol. 75 (2). - P. 27–34.

112. McCrea S.J. Advanced peri-implantitis cases with radical surgical treatment // J. Periodontal Implant Sci. – 2014. – Vol. 44(1). – P.39–47.

113. McSwiney T.P., Collins J.M., Bassi G.S., Khan S. The interdisciplinary management of hypodontia patients in the UK: a national service evaluation // Br. Dent. J. - 2017. - Vol. 222(1). - P.31-35.

114. Nguyen M.S., Saag M., Voog-Oras Ü. et al. Temporomandibular Disorder Signs, Occlusal Support, and Craniofacial Structure Changes Among them.

115. Pereira L.J., Gavião M.B., Bonjardim L.R., Castelo P.M. Ultrasound and tomographic evaluation of temporomandibular joints in adolescents with and without signs and symptoms of temporomandibular disorders: a pilot study // Dento Maxillo Facial Radiol. - 2007b. - Vol. 36 (7). - P.402–408.

116. Pessoa D.R. Association of facial massage, dry needling, and laser therapy in Temporomandibular Disorder: case report // Codas. – 2018. – Vol. 30 (6).

117. Piancino M.G., Isola G., Merlo A. et al. Chewing pattern and muscular activation in open bite patients // J. Electromyogr. Kinesiol. - 2012. - Vol. 22. - P. 273–279.

118. . Pirelli P., Saponara M., Guilleminault C. Rapid maxillary expansion before and after adenotonsillectomy in children with obstructive sleep apnea // Maxillomandibular advancement for treatment of obstructive sleep apnea

119. Porwal A., Sasaki K. Current status of the neutral zone: a literature review // Journal of Prosthetic Dentistry. - 2013. - Vol.109. - P. 129–134.

120. Rebaudi A., Trisi P., Cella R., Cecchini G. Preoperative evaluation of bone quality and bone density using a novel CT/micro CT - based hard-normal-soft classification system // Int. J. Oral Maxillofac. Imp. - 2010. - Vol. 25, No 1. - P. 75-85.

121. Romanos G.E., Javed F., Delgado-Ruiz R.A., Calvo-Guirado J.L. Peri-implant diseases: a review of treatment interventions // Dent. Clin. North Am. – 2015. – Vol.59 (1). – P.157-178.

122. Romsics L., Segatto A., Boa K. et al. Dentofacial mini- and microesthetics as perceived by dental students: A cross sectional multi-site study // PLOS ONE. - 2020. - Vol.14.- doi.org/10.1371/journal.pone.0230182

123. Ronchin M. European Board of Orthodontics case report: malocclusion in adult patient // Prog Orthod. - 2006. - Vol. 7 (1). - P.86-94.

124. Rosa W.G., Navarro Rde L., Conti A.C. et al. Assessment of cephalometric characteristics in the elderly // Braz. Oral Res. - 2015. - V ol.29: S1806-83242015000100233.

125. Saeidi Pour R., Engler M.L., Edelhoff D. et al. A patient-calibrated individual wax-up as an essential tool for planning and creating a patient-oriented

126. Sanchez-Siles M., Torres-Diez L.C., Camacho-Alonso F. et al. High Volume Local Anesthesia as a Postoperative Factor of Pain and Swelling in Dental Implants // Clin. Implant Dent. Relat. Res. – 2014. - Vol.16(3). – P.429-434.

127. Schiffman E., Ohrbach R. Executive summary of the Diagnostic Criteria for Temporomandibular Disorders for clinical and research applications // J. Am. Dent. Assoc. 2016. - Vol.147 (6). - P. 438–445.

128. Schiffman E.L., Truelove E.L., Ohrbach R. et al. Assessment of the Validity of the Research Diagnostic Criteria for Temporomandibular Disorders: Overview and Methodology // J. Orofac. Pain. - 2010. - Vol.24 (1). - P.7–24.

129. Schminke B., Vom Orde F., Gruber R. et al. The pathology of bone tissue during peri-implantitis // J. Dent. Res. – 2015. – Vol.94 (2). – P.354-361.

130. Schmitter M., Kares-Vrincianu A., Kares H. et al. Sleep-associated aspects of myofascial pain in the orofacial area among Temporomandibular Disorder patients and controls // Sleep Med. - 2015. - Vol. 16 (9). - P. 1056–1061.

131. Schneider S., Peipsi A., Stokes M. et al. Feasibility of monitoring muscle health in microgravity environments using Myoton technology // Med. Biol. Engin. Comput. - 2.15. - Vol.53. - P. 57–66.

132. Sesma N., Pannuti C.M., Cardaropoli G. Retrospective clinical study of 988 dual Acid-etched implants placed in grafted and native bone for single-tooth replacement // Int. J. Oral. Maxillofac Implants. - 2012. - Vol.27 (5). - P. 1243- 1248.

133. Shaeran T.A.T., Samsudin A.R. Temporomandibular Joint Ankylosis Leading to Obstructive Sleep Apnea // J. Craniofac. Surg. - 2019. - Vol.30(8). - P .714-717.

134. Sheridan R.A., Decker A.M., Plonka A.B., Wang H.L. The role of occlusion in implant therapy: a comprehensive updated review // Implant Dentistry. - 2016. - Vol. 2. - P. 829–838.

135. Shimizu T., Motegi E., Nomura M. et al. Cephalometric study of elderly with nearly intact dental arches // Gerodontology. - 2006. - Vol.23 (1). - P. 60–63.

136. Silvestrini-Biavati A., Migliorati M., Demarziani E. et al. Clinical association between teeth malocclusions, wrong posture and ocular convergence disorders: an epidemiological investigation on primary school children. BMC Pediatr. – 2013. – Vol. 13. – P. 12.

137. Sipahi Calis A., Colakoglu Z., Gunbay S. The use of botulinum toxin- an in the treatment of muscular temporomandibular joint disorders// J Stomatol Oral Maxillofac Surg. – 2019. - Vol.256. - P.225-232.

138. Slade G., Slade G., Spenser J. Development and evaluation of the Oral Health Impact Profile // Community Dental Health. – 1994. – Vol. 11. – P. 3–5.

139. Smeets R., Henningsen A., Jung O. et al. Definition, etiology, prevention and treatment of peri-implantitis - a review // Head Face Med. – 2014. – Vol. 10. – P.34.

140. Talaat W., Bayatti S.A., Kawas S.A. CBCT analysis of bony changes associated with temporomandibular disorders // CRANIO®. - 2016. - Vol.34 (2). - P.88–94.

141. Tamimi F., Torres J., Al-Abedalla K. et al. Osseointegration of dental implants in 3D-printed synthetic onlay grafts customized according to bone metabolic activity in recipient site // Biomaterials. - 2014.- Vol.35 (21). – P.5436- 5445.

142. Tavano K.T., Seraidarian P.I., de Oliveira D.D., Jansen W.C. Determination of vertical dimension of occlusion in dentate patients by cephalometric analysis - pilot study // Gerodontology. - 2012. T - Vol.29 (2). - P .297-305.

143. Tecco S., Marzo G., Crincoli V. et al. The prognosis of myofascial pain syndrome (MPS) during a fixed orthodontic treatment // Cranio. - 2012. - Vol.30(1). - P. 52–71.

144. Thiyagarajan A, Kumar D. Dental Esthetics: Perception from Future Dental Professionals // Acta Scientific Dental Sciences. - 2018.- Vol. 24. - P.3–5.

145. Tomonari H., Takada H., Hamada T. et al. Micrognathia with temporomandibular joint ankylosis and obstructive sleep apnea treated with mandibular distraction osteogenesis using skeletal anchorage: a case report // Head Face Med. - 2017. - Vol.13(1):20.

146. Tosato Jde P., Caria P.H., Gomes C.A, et al. Correlation of stress and muscle activity of patients with different degrees of temporomandibular disorder // J. Phys. Ther. Sci. - 2015. - Vol.27 (4). - P. 1227–1231.

147. Tosun H., Kaya B. Effect of maxillary incisors, lower lip, and gingival display relationship on smile attractiveness // Am. J. Orthod. Dentofacial. Orthop. - 2020. - Vol.157(3). - P.340-347.

148. Van Noort R. The future of dental devices is digital // Dent. Mater. - 2012. - Vol. 28 (1). - P. 3 - 12.

149. Van Velzen F.J., Ofec R., Schulten E.A., Ten Bruggenkate C.M. 10- Year survival rate and the incidence of peri-implant disease of 374 titanium dental implants with a SLA surface: a prospective cohort study in 177 fully and partially edentulous patients // Clin. Oral. Implant. Res. – 2014. - doi:10.1111/clr.12499

150. Verse T., Bodlaj R., De la Chaux R. et al. Guideline: Treatment of obstructive sleep apnea in adults // ArGe Schlafmedizin der Deutschen

151. Villa M.P., Miano S., Rizzoli A. Mandibular advancement devices are an alternative and valid treatment for pediatric obstructive sleep apnea syndrome // Sleep Breath. - 2012. – Vol.16 (4). – P.971-976.

152. Vogl T.J., Lauer H.C., Lehnert T. et al. The value of MRI in patients with temporomandibular joint dysfunction: Correlation of MRI and clinical findings // Eur. J. Radiol. - 2016. - Vol. 85 (4). - P.714–719.

153. Woods M.G. The mandibular muscles in contemporary orthodontic practice: a review // Aust. Dent. J. - 2017. - Vol.62 (1). - P.78–85.

154. Yau H.T., Yang T.J., Chen Y.C. Tooth model reconstruction based upon data fusion for orthodontic treatment simulation // Comput. Biol. Med. - 2014. – Vol.48. – P.8-16.

155. Zain-Alabdeen E.H., Alsadhan R.I. A comparative study of accuracy of detection of surface osseous changes in the temporomandibular joint using multidetector CT and cone beam CT // Dento Maxillo Facial Radiol. - 2012. - Vol.41 (3). - P. 185–191.

156. Zhou J., Li D.H., Zhu P.F. et al. Effect of mandibular advancement device on the stomatognathic system in patients with mild-to-moderate obstructive sleep apnoea-hypopnoea syndrome // J. Oral. Rehabil. - 2020. - Vol.47(7). - P .889-901.