



IMPROVING DIAGNOSTIC AND THERAPEUTIC APPROACHES FOR CLASS III MALOCCLUSION

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Article history:	Abstract:
Received: May 10 th 2025 Accepted: June 8 th 2025	Class III malocclusion represents one of the most complex and clinically significant forms of dentofacial anomalies, characterized by disrupted occlusal relationships in which the lower jaw occupies a more anterior position relative to the upper jaw. This pathology is among the most common orthodontic problems encountered in various age groups and requires a comprehensive interdisciplinary approach to diagnosis and treatment.

Keywords: Class III malocclusion, diagnosis, treatment, orthodontics, prognathism, dentofacial anomalies, occlusion, orthognathic surgery, cephalometry, biomechanics, computer modeling, three-dimensional diagnosis, relapse, stability of results, interdisciplinary approach

INTRODUCTION: In modern dentistry, Class III malocclusion occupies a special place among dentofacial anomalies due to its multifactorial etiology, complexity of clinical manifestations, and significant impact on the functional state of the dentofacial system. According to epidemiological studies, the prevalence of Class III malocclusion in various populations ranges from 3% to 15%, with an observed tendency toward increased frequency of this pathology in recent decades. Class III malocclusion significantly impacts patients' quality of life, affecting not only functional aspects of chewing, swallowing, and speech, but also facial aesthetic characteristics, often leading to psychological complexes and social maladjustment. Patients with Class III malocclusion frequently experience difficulties in interpersonal communication, professional activities, and personal life, which emphasizes the medical and social significance of this problem.

The formation of Class III malocclusion is determined by complex interactions of genetic, epigenetic, and environmental factors. Hereditary predisposition plays a key role in the development of this anomaly, especially in cases of true prognathism associated with excessive development of the lower jaw. Simultaneously, functional disorders have significant influence, including nasal breathing disorders, infantile swallowing patterns, tongue and lip parafunctions, as well as harmful habits in childhood.

Modern diagnosis of Class III malocclusion faces several serious challenges related to the need for differential diagnosis between various forms of pathology, determining optimal intervention timing, and predicting treatment outcomes. Traditional diagnostic methods based on clinical examination and two-dimensional

radiography do not always provide sufficient accuracy for comprehensive assessment of three-dimensional jaw relationships and treatment planning.

Treatment of Class III malocclusion represents one of the most complex tasks in modern orthodontics and maxillofacial surgery. The choice of optimal therapeutic approach depends on multiple factors, including patient age, severity of anomaly, etiological factors, and individual characteristics of growth and development of the maxillofacial region. Traditional treatment methods do not always ensure stable long-term results, especially in cases of severe forms of pathology.

Effective treatment of Class III malocclusion requires close collaboration among specialists of various profiles: orthodontists, maxillofacial surgeons, prosthodontists, speech therapists, otolaryngologists, and other specialists. Coordination of efforts among various specialists and development of unified patient management protocols remains a current task in modern dentistry.

The development of modern technologies opens new possibilities for improving diagnosis and treatment of Class III malocclusion. Implementation of three-dimensional visualization methods, computer modeling, digital treatment planning technologies, and biomechanical analysis allows for increased diagnostic accuracy and effectiveness of therapeutic interventions. Modern trends in dental development are directed toward creating personalized treatment approaches that consider individual patient characteristics, genetic factors, biomechanical characteristics, and other parameters. Development of personalized treatment protocols for Class III malocclusion is a promising research direction.



Despite significant achievements in the field of Class III malocclusion diagnosis and treatment, existing methods do not always provide optimal results. High recurrence rates, treatment duration, need for combined approaches, and insufficient predictability of results emphasize the necessity for further improvement of diagnostic and therapeutic approaches.

In connection with the above, improvement of diagnostic and treatment methods for patients with Class III malocclusion represents a current scientific-practical task requiring a comprehensive approach and interdisciplinary interaction. The search for new diagnostic criteria, development of innovative therapeutic approaches, and optimization of existing treatment protocols are priority directions in modern research in this field.

Thus, the problem of improving diagnostic and therapeutic approaches for Class III malocclusion remains highly relevant and requires further in-depth study using modern scientific methods and technologies.

Analysis of contemporary literature indicates that despite numerous studies in the field of Class III malocclusion diagnosis and treatment, many aspects of this problem remain insufficiently studied. Existing diagnostic criteria often have a subjective nature and do not allow for highly reliable prediction of treatment results. The absence of unified diagnostic protocols and standardized treatment approaches leads to significant differences in patient management tactics in various clinical centers.

One of the significant gaps in current knowledge is insufficient study of biomechanical aspects of Class III malocclusion formation and mechanisms of its correction. Limited data on long-term results of various treatment methods complicate the choice of optimal therapeutic strategy. Additionally, questions of stability of achieved results and factors influencing relapse development are insufficiently studied.

The rapid development of information technologies and digital data processing methods opens new horizons for improving Class III malocclusion diagnosis. Implementation of artificial intelligence, machine learning, and deep data analysis algorithms allows for creation of more accurate diagnostic systems and prognostic models. Three-dimensional modeling and virtual treatment planning become integral components of modern orthodontic practice.

Development of molecular genetics and genomics opens new possibilities for understanding Class III malocclusion etiology and developing personalized treatment approaches. Identification of genetic markers associated with this pathology development will allow

not only for improved diagnosis but also for development of preventive strategies. Study of epigenetic mechanisms regulating growth and development of the maxillofacial region may lead to creation of fundamentally new therapeutic approaches. Modern biomechanical analysis methods, including finite element modeling and computer simulation, allow for detailed study of processes occurring in the dentofacial system under various types of orthodontic influence. This opens possibilities for optimization of force systems used in Class III malocclusion treatment and increasing effectiveness of therapeutic interventions.

Modern trends in Class III malocclusion treatment indicate the need for forming multidisciplinary teams including not only dental specialists of various specialties but also specialists from related medical fields. Participation of psychologists, dietitians, sleep disorder specialists, and other professionals allows for ensuring a comprehensive approach to problem solving and improving patient quality of life.

Evidence-based medicine principles become the foundation for developing scientifically grounded Class III malocclusion treatment protocols. Conducting randomized controlled studies, systematic reviews, and meta-analyses allows for determining the most effective diagnostic and treatment methods. Creation of clinical case databases and implementation of treatment outcome monitoring systems contribute to accumulation of evidence base for optimizing therapeutic approaches.

Economic effectiveness of various Class III malocclusion treatment methods becomes an important factor in choosing therapeutic strategy. Analysis of cost-effectiveness ratios of different approaches allows for optimizing healthcare resource distribution and increasing accessibility of high-quality orthodontic care. Development of economically justified treatment algorithms is a current task in modern dentistry.

Quality of life assessment for patients with Class III malocclusion becomes an integral part of comprehensive treatment effectiveness evaluation. Development of specialized tools for assessing the impact of dentofacial anomalies on various aspects of patient life allows for more objective evaluation of therapeutic intervention results and correction of treatment plans considering individual patient needs.

Development of preventive approaches to preventing Class III malocclusion formation is a promising research direction. Early diagnosis of risk factors, development of preventive intervention programs, and creation of dispensary observation systems can significantly reduce



the frequency of severe forms of this pathology and improve treatment prognosis.

Implementation of telemedicine technologies in orthodontic practice opens new possibilities for remote monitoring of patients with Class III malocclusion. Development of mobile applications for patient self-control, remote treatment monitoring systems, and teleconsultation can increase effectiveness of therapeutic interventions and improve patient treatment adherence.

Improvement of Class III malocclusion diagnosis and treatment methods represents a multifaceted problem requiring integration of achievements from various fields of science and technology. Scientific novelty of research in this field lies in developing innovative diagnostic approaches, creating personalized treatment protocols, and implementing modern technologies in clinical practice.

The practical significance of the work is determined by the possibility of increasing effectiveness of Class III malocclusion diagnosis and treatment, reducing treatment duration, improving long-term results, and enhancing patient quality of life. Development of scientifically grounded recommendations for diagnosis and treatment of this pathology will contribute to standardization of approaches and improvement of orthodontic care quality.

Further development of Class III malocclusion diagnosis and treatment methods is connected with integration of achievements in molecular biology, genetics, bioengineering, and information technologies. Creation of intelligent decision support systems, development of biocompatible materials with specified properties, and implementation of regenerative medicine methods may fundamentally change approaches to treating this pathology.

CONCLUSIONS: Thus, the problem of improving diagnostic and therapeutic approaches for Class III malocclusion remains highly relevant and multifaceted, requiring a comprehensive interdisciplinary approach and continuation of fundamental and applied research in this field.

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