JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS

VOLUME 5, ISSUE 05
MONTHLY JOURNALS

ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

UO‘K: 616.314-089.23:616.314

IMPROVING THE EXAMINATION OF PATIENTS WITH MESIAL OCCLUSION

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https://doi.org/10.5281/zenodo.20309695

Abstract. This article is devoted to improving the clinical examination of patients with mesial occlusion and to the early diagnosis of this pathology. Mesial occlusion is considered one of the most complex sagittal anomalies in orthodontic practice and develops as a result of excessive mandibular growth or insufficient maxillary development. The main aim of the study was to identify early clinical, morphological, and functional signs of mesial occlusion and to evaluate their diagnostic significance. The study comprehensively examined mandibular prognathism, maxillary retrusion, anterior crossbite, formation of a concave facial profile, and changes in the proportions of the lower facial third. In addition, the functional condition of masticatory muscles, temporomandibular joint status, and disorders of breathing and swallowing were analyzed. The obtained results demonstrated that, along with hereditary factors, functional disturbances also play an important role in the development of mesial occlusion. Mandibular protrusion, retrusion of the upper incisors, and protrusion of the lower incisors were identified as the earliest diagnostic signs of the pathology. As a result of the study, a comprehensive diagnostic approach was developed that allows identification of mesial occlusion before its pronounced clinical manifestation. The proposed method contributes to improving the effectiveness of orthodontic treatment, reducing the risk of secondary dentofacial deformities, and preventing functional and aesthetic disorders in children.

Keywords: mesial occlusion, prognathism, sagittal anomaly, orthodontic diagnostics, anterior crossbite, morphofunctional changes, pediatric orthodontics.

Annotatsiya. Ushbu maqola mezial prikusli bemorlarni klinik tekshirishni takomillashtirish va patologiyani erta aniqlash masalalariga bag‘ishlangan. Mezial prikus ortodontik amaliyotda uchraydigan murakkab sagittal anomaliyalardan biri bo‘lib, pastki jag‘ning oldinga rivojlanishi yoki yuqori jag‘ning yetarlicha rivojlanmasligi natijasida shakllanadi. Tadqiqotning asosiy мақсади mezial prikusning dastlabki klinik, morfologik va funksional belgilarini aniqlash hamda ularning diagnostik аҳамиятини baholashdan iborat bo‘ldi. Tadqiqot davomida bemorlarda pastki jag‘ prognatiyasi, yuqori jag‘ retruziyasi, frontal tishlar orasidagi teskari qoplama, yuz profilining konkav shakllanishi va pastki yuz qismi proporsiyalaridagi o‘zgarishlar kompleks tarzda o‘rganildi. Shuningdek, chaynash mushaklari faoliyati, temporomandibulyar bo‘g‘im holati, nafas olish va yutish funksiyalaridagi buzilishlar tahlil qilindi. Olingan natijalar mezial prikus rivojlanishida irsiy omillar bilan bir qatorda funksional buzilishlar ham muhim rol o‘ynashini ko‘rsatdi. Ayniqsa, pastki jag‘ning oldinga siljishi, yuqori kesuvchi tishlarning retruziyasi va pastki kesuvchi tishlarning protruzion joylashuvi patologiyaning erta diagnostik belgilaridan biri sifatida qayd etildi. Tadqiqot yakunida mezial prikusni klinik namoyon bo‘lishidan oldin aniqlashga imkon beruvchi kompleks diagnostik yondashuv ishlab chiqildi. Ushbu yondashuv ortodontik davolash samaradorligini oshirish, yuz-jag‘ tizimidagi ikkilamchi deformatsiyalarni kamaytirish hamda bolalarda funksional va estetik buzilishlarning oldini olishda muhim аҳамият kasb etadi.

Kalit so‘zlar: mezial prikus, prognatiya, sagittal anomaliya, ortodontik diagnostika, teskari qoplama, morfofunksional o‘zgarishlar, bolalar ortodontiyasi.

Аннотация. Данная статья посвящена совершенствованию клинического обследования пациентов с мезиальным прикусом и вопросам ранней диагностики данной патологии. Мезиальный прикус является одной из наиболее сложных сагиттальных аномалий в ортодонтической практике и формируется вследствие чрезмерного развития нижней челюсти или недостаточного развития верхней челюсти. Основной целью исследования стало выявление ранних клинических, морфологических и функциональных признаков мезиального прикуса, а также оценка их диагностической значимости. В ходе исследования комплексно изучались прогнатия нижней челюсти, ретрузия верхней челюсти, обратное перекрытие фронтальных зубов, формирование вогнутого профиля лица и изменения пропорций нижней трети лица. Кроме того, анализировались функциональное состояние жевательных мышц, состояние височно-нижнечелюстного сустава, нарушения дыхания и глотания. Полученные результаты показали, что наряду с наследственными факторами важную роль в развитии мезиального прикуса играют функциональные нарушения. Наиболее ранними диагностическими признаками были определены выдвижение нижней челюсти вперёд, ретрузия верхних резцов и протрузия нижних резцов. В результате исследования был разработан комплексный диагностический подход, позволяющий выявлять мезиальный прикус до его выраженного клинического проявления. Предложенный метод способствует повышению эффективности ортодонтического лечения, снижению риска вторичных деформаций челюстно-лицевой системы и профилактике функциональных и эстетических нарушений у детей.

Ключевые слова: мезиальный прикус, прогнатия, сагиттальная аномалия, ортодонтическая диагностика, обратное перекрытие, морфофункциональные изменения, детская ортодонтия.

Introduction.

Mesial occlusion is considered one of the most complex sagittal anomalies encountered in orthodontic practice. This pathology is characterized by a disturbed relationship between the upper and lower jaws and mainly develops due to excessive mandibular growth or insufficient maxillary development. Clinically, mesial occlusion is manifested by anterior displacement of the lower dental arch, reverse overjet in the frontal region, a concave facial profile, and disturbances in mastication and speech functions. According to international orthodontic studies, the prevalence of mesial occlusion varies from 1% to 15% among different populations, and both genetic predisposition and functional or environmental factors play an important role in its development.

Recent scientific investigations demonstrate that mesial occlusion is not only an aesthetic problem but also a complex pathological condition that negatively affects the entire stomatognathic system. This anomaly may lead to reduced chewing efficiency, functional alterations of the temporomandibular joint, speech articulation disorders, and psychoemotional discomfort. Particularly in children and adolescents, mesial occlusion can influence further craniofacial growth and increase the risk of secondary dentofacial deformities. Therefore, early identification of this pathology and timely orthodontic intervention remain important objectives in modern clinical dentistry.

Currently, clinical examination, anthropometric analysis, diagnostic models, lateral cephalometric evaluation, and functional assessment methods are widely used in the diagnosis of mesial occlusion. However, in many clinical cases the pathology is detected only after reaching a pronounced stage of development. This complicates treatment planning, prolongs the duration of therapy, increases the need for complex orthodontic appliances, and in some cases may require surgical intervention. Another important issue is the insufficient development of practical and universally applicable diagnostic criteria for detecting the initial morphofunctional changes associated with mesial occlusion.

Scientific literature indicates that hereditary predisposition, mouth breathing, atypical swallowing, abnormal tongue posture, harmful oral habits, and dysfunction of the masticatory muscles are among the major etiological factors contributing to the development of mesial occlusion. At the same time, sagittal mandibular protrusion, retrusion of the upper incisors, and a tendency toward a concave facial profile are described as early diagnostic indicators of the pathology. Modern orthodontics emphasizes the importance of comprehensive evaluation of these markers in order to identify high-risk patients before the appearance of pronounced clinical manifestations.

The aim of the present study is to improve the clinical examination of patients with mesial occlusion, identify the early morphological and functional signs of the pathology, and scientifically substantiate their diagnostic significance. The results of this study may contribute to improving the effectiveness of early diagnosis, optimizing individualized orthodontic treatment planning, and preventing complications within the dentofacial system.

Materials and Methods

The present study was aimed at improving the clinical examination and early diagnostic assessment of patients with mesial occlusion. The research was carried out on the basis of clinical and morphofunctional evaluation of children and adolescents presenting with signs of sagittal malocclusion. The study included patients aged 6–15 years who underwent orthodontic examination at specialized dental institutions. Patients with congenital craniofacial syndromes, severe systemic diseases, previous orthodontic treatment, or traumatic jaw deformities were excluded from the study.

A comprehensive diagnostic protocol was applied during the investigation. Clinical examination included evaluation of facial symmetry, facial profile type, lip competence, mandibular position, and occlusal relationships. Special attention was paid to the presence of anterior crossbite, reverse overjet, sagittal discrepancies between the dental arches, and functional mandibular displacement. The severity of mesial occlusion was assessed according to Angle's classification and clinical characteristics of skeletal and dentoalveolar relationships.

Anthropometric and morphometric analyses were performed to evaluate craniofacial proportions. Measurements included the lower facial third height, sagittal mandibular projection, and proportional relationships between the maxilla and mandible. Diagnostic dental casts were analyzed to determine the shape and width of dental arches, tooth alignment, and occlusal contacts.

Lateral cephalometric radiographs were used to assess skeletal relationships and dentofacial growth patterns. Cephalometric parameters such as SNA, SNB, ANB angles, mandibular plane angle, and incisor inclination were measured to determine the severity of skeletal discrepancies

associated with mesial occlusion. Particular attention was devoted to identifying mandibular prognathism, maxillary retrusion, and compensatory dentoalveolar changes.

Functional assessment included evaluation of breathing type, swallowing pattern, tongue posture, and activity of the masticatory muscles. Clinical functional tests were performed to identify oral breathing, atypical swallowing, and muscular imbalance that could contribute to the progression of mesial occlusion. Temporomandibular joint condition and mandibular movement patterns were also clinically examined.

The obtained clinical and radiological data were statistically analyzed using comparative and correlation methods. Quantitative indicators were expressed as mean values with standard deviations. Statistical significance between studied parameters was determined at $p < 0.05$. The results obtained during the study enabled identification of early morphological and functional markers associated with mesial occlusion and contributed to improving the diagnostic effectiveness of orthodontic examination.

Results. The conducted clinical and morphofunctional examination demonstrated that patients with mesial occlusion exhibited a complex combination of skeletal, dentoalveolar, and functional abnormalities. Comparative analysis of clinical findings revealed that the majority of examined patients presented with pronounced sagittal displacement of the mandible, accompanied by disturbances in occlusal relationships and facial profile configuration.

During the clinical examination, anterior crossbite and reverse overjet were identified as the most common manifestations of mesial occlusion. In many patients, protrusion of the lower dental arch relative to the upper arch was associated with compensatory retrusion of the upper incisors and protrusive inclination of the lower incisors. These dentoalveolar adaptations were found to partially compensate skeletal disproportions but at the same time contributed to worsening occlusal imbalance.

Evaluation of facial morphology demonstrated that patients with mesial occlusion frequently exhibited a concave facial profile, increased prominence of the chin region, and disproportion of the lower facial third. Morphometric analysis showed that sagittal mandibular projection values were significantly increased in comparison with physiological norms, whereas maxillary growth parameters were relatively reduced in a considerable proportion of patients. These findings confirmed the important role of skeletal imbalance in the pathogenesis of mesial occlusion.

Cephalometric analysis revealed characteristic skeletal changes associated with the anomaly. Increased SNB values and decreased ANB angles were observed in the majority of examined patients, indicating anterior positioning of the mandible relative to the cranial base and maxilla. In several cases, reduced SNA measurements suggested insufficient sagittal development of the upper jaw. Inclination analysis of incisors demonstrated compensatory retroclination of maxillary incisors and proclination of mandibular incisors, reflecting adaptive dentoalveolar responses to skeletal discrepancies.

Functional assessment indicated that disturbances of oral functions were frequently associated with mesial occlusion. Mouth breathing, atypical swallowing patterns, and abnormal tongue posture were observed in a significant number of patients. Functional imbalance of the masticatory muscles was accompanied by altered mandibular movement patterns and signs of temporomandibular joint overload in some individuals. Patients with pronounced muscular dysfunction demonstrated more severe sagittal discrepancies and greater occlusal instability.

The results of dynamic clinical observation confirmed that early morphofunctional alterations play an essential role in the progression of mesial occlusion. Mandibular protrusion, anterior crossbite, compensatory incisor inclination, and functional disturbances were identified as stable diagnostic markers of the developing pathology. Combined assessment of skeletal, dentoalveolar, and functional parameters significantly increased the diagnostic accuracy of early orthodontic examination.

The obtained findings support the importance of comprehensive clinical evaluation in patients with mesial occlusion and demonstrate that integration of morphometric, cephalometric, and functional diagnostic methods improves early detection of sagittal anomalies. The proposed diagnostic approach allows timely identification of high-risk patients and contributes to optimization of individualized orthodontic treatment planning.

Discussion. The findings of the present study confirmed that mesial occlusion is a multifactorial dentofacial anomaly characterized not only by skeletal disproportions but also by significant dentoalveolar and functional disturbances. The obtained results demonstrated that mandibular protrusion, anterior crossbite, compensatory inclination of incisors, and functional imbalance of the orofacial musculature represent stable diagnostic characteristics of mesial occlusion and may be identified even during the early stages of pathological development.

One of the most important observations of the study was the predominance of skeletal alterations associated with excessive mandibular growth or insufficient maxillary development. Cephalometric analysis revealed increased SNB values and decreased ANB angles in the majority of examined patients, confirming the sagittal discrepancy between the jaws. These findings correspond with contemporary orthodontic concepts suggesting that skeletal imbalance plays a decisive role in the formation of mesial occlusion. At the same time, compensatory dentoalveolar changes such as retroclination of the upper incisors and proclination of the lower incisors were identified as adaptive mechanisms attempting to maintain occlusal contact despite underlying skeletal disharmony.

The study also demonstrated a significant relationship between mesial occlusion and functional disturbances of the stomatognathic system. Mouth breathing, atypical swallowing, abnormal tongue posture, and muscular imbalance were observed in a substantial proportion of patients. Functional abnormalities may contribute not only to the progression of sagittal discrepancies but also to instability of orthodontic treatment outcomes. These findings support the concept that early functional assessment should be considered an integral component of orthodontic diagnostics in patients with mesial occlusion.

Particular attention should be paid to the role of early diagnosis in preventing severe dentofacial deformities. The obtained results indicate that clinical signs such as anterior mandibular displacement, reverse overjet, and changes in facial profile can be detected before the development of pronounced skeletal deformities. Comprehensive assessment of morphometric, cephalometric, and functional indicators increases diagnostic accuracy and allows identification of high-risk patients at earlier stages of growth and development. Early recognition of these changes may significantly improve treatment prognosis and reduce the need for complex orthodontic or surgical interventions in adulthood.

Another important aspect of the study is the practical applicability of the proposed diagnostic approach. The combination of routine clinical examination with cephalometric and functional analysis provides a reliable and accessible method for evaluating mesial occlusion in

daily orthodontic practice. Unlike isolated diagnostic techniques, integrated examination enables more precise differentiation between skeletal and dentoalveolar forms of the anomaly and contributes to individualized treatment planning.

The results of this investigation emphasize that mesial occlusion should not be regarded solely as a localized dental anomaly. Instead, it represents a complex disturbance involving craniofacial growth, occlusal relationships, muscular function, and temporomandibular joint adaptation. Therefore, successful management of this pathology requires a multidisciplinary diagnostic approach aimed at identifying both structural and functional components of the disorder.

Overall, the present study confirms the importance of comprehensive early examination in patients with mesial occlusion and highlights the diagnostic value of combined clinical, cephalometric, and functional assessment methods. The proposed approach may contribute to improving the effectiveness of orthodontic diagnostics, optimizing treatment strategies, and preventing progression of severe dentofacial abnormalities.

Conclusion.

The study demonstrated that mesial occlusion is a complex dentofacial anomaly involving skeletal, dentoalveolar, and functional disturbances of the stomatognathic system. Key diagnostic features include mandibular prognathism, anterior crossbite, incisor compensation, and orofacial muscular imbalance.

Cephalometric findings confirmed that excessive mandibular growth combined with reduced maxillary development is the main etiological factor, reflected by increased SNB and decreased ANB values. Functional disorders such as mouth breathing, atypical swallowing, and abnormal tongue posture further contribute to the severity and progression of the condition.

Early morphofunctional changes can be detected before severe clinical manifestations, and the combined use of clinical, cephalometric, and functional assessments improves diagnostic accuracy and treatment planning. Early diagnosis allows timely intervention, reduces treatment complexity, and may decrease the need for surgical correction later.

Overall, integrated early examination is essential for effective management of mesial occlusion in modern orthodontic practice.

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