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Temporomandibular Joint Dysfunction Caused by Errors in The Planning and Fabrication of Orthopedic Constructions

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Abstract: Within the scope of this study, a comprehensive correlation analysis was performed between the development of pathological conditions of the temporomandibular joint and iatrogenic factors arising during the stages of removable prosthetic treatment. The research was based on a detailed study of anamnestic data, objective examination findings, and supplementary diagnostic indicators, including computed tomography and magnetic resonance imaging. It was established that precision planning of orthopedic rehabilitation requires mandatory and in-depth history taking combined with a thorough examination of the articular apparatus and a comprehensive analysis of the occlusal relationships of the jaws.

Keywords: TMJ Dysfunction, Iatrogenic Errors, Occlusal Anomalies

Introduction

The condition of the temporomandibular joints is a fundamental factor in the body's overall homeostasis. Despite progress in dentistry, the widespread use of removable prostheses correlates with an increase in the number of TMJ pathologies. The effectiveness of rehabilitation is directly determined by the clinician's competencies. Minimizing iatrogenic complications requires the practitioner to have in-depth knowledge of gnathology, including precision diagnostics, correction of occlusal disorders, and rational planning of prosthetics. [1,2,3]

Temporomandibular joint (TMJ) dysfunctions are a complex of musculoskeletal disorders affecting the articulation, the myofascial apparatus, and the dentoalveolar system as a whole. First described by J. B. Costen in 1934, this syndrome develops as a result of functional overload of the joint, the etiological factors of which include occlusal disorders, edentulism, iatrogenic errors during orthopedic and orthodontic treatment stages, as well as muscle parafunction and trauma. A pressing problem remains the low awareness among specialists in related fields regarding TMJ symptoms, which leads to diagnostic errors and ineffective symptomatic therapy by general practitioners and otorhinolaryngologists. The growing number of patients with defects in the dental arches and malocclusion dictates the need to improve specialized rehabilitation methods. [4,5,6]

According to the analysis of modern literature, a unified classification of iatrogenic errors in removable prosthetics, which provoke the development of CNS dysfunctions, has not yet been developed in dental practice. Researchers emphasize a deterministic relationship between the symptoms of joint disorders and the discrepancy between central occlusion and the central relationship of the jaws. According to Okeson, the central ratio is the most stable biomechanical position, where the joint heads are centered in the pits and the disc occupies a physiological position. Thus, achieving harmony in the central ratio is a basic condition for preventing dysfunctions during orthopedic rehabilitation using removable devices. [7,8,9]. This work aims to conduct a correlation analysis between defects in planning and implementing orthopedic treatment with removable devices and the development of functional disorders of the temporomandibular joint.

To achieve this goal, it is planned to monitor the condition of patients with CNS pathologies and verify the spatial position of the articular disc and mandibular heads using magnetic resonance imaging and computed tomography, taking into account the etiology of the disease[10,11].. Based on the obtained data, it is proposed to develop and justify combined treatment tactics, as well as optimize rehabilitation protocols to significantly reduce the recovery time for patients with removable orthopedic structures [12,13].

The aim of the study is to study the etiological relationship between iatrogenic factors in orthopedic treatment

and the development of joint dysfunctions. Based on the obtained data, recommendations were developed aimed at improving prevention methods and increasing the effectiveness of comprehensive rehabilitation for patients with CNS pathologies.

Methodology

To analyze errors and complications in removable prosthetics that provoke CNS dysfunction, 234 patients with partial adentia who underwent orthopedic treatment in Tashkent clinics were examined. The sample consisted of 102 men (43.58%) and 132 women (56.42%) aged 35 to 65 years. The inclusion criterion for the study was the presence and use of removable orthopedic structures. During the study, it was established that 161 individuals (68.8% of the total number of examined individuals) complained of symptoms involving the temporomandibular joints and masticatory muscles.

Results and Discussion

A comprehensive examination of patients with partial adentia using various types of removable structures (plate, bugel with various fixation systems, immediate prostheses) revealed that in 23% of cases, orthopedic treatment provokes the development of pain syndrome in the CNS, face, and neck areas, as well as paresthesias and muscular parafunctions. The most common complaints were joint noise (clicks, crepitation), myalgia, and restricted mouth opening amplitude. It has been established that these symptoms developed against the background of a decrease in interalveolar height, mandibular distention, and impaired orientation of the prosthetic plane. The severity of the pathology was directly correlated with the severity of adentia, the topography of defects, and the duration of tooth absence prior to prosthetics. The clinical picture was supplemented by complaints of occlusive instability ("finding" a comfortable jaw position), chronic muscle fatigue, trauma to the soft tissues of the oral cavity, and dissatisfaction with the aesthetic result of treatment.

During the study, the main etiological factors for the development of CNS dysfunction associated with prosthetic errors were structured. It was established that in 30% of cases, the pathology was triggered by a simultaneous increase in interclusion height of more than 3.5 mm. In 35% of observations, the reason was the absence of temporary fixation of occlusion for more than eight weeks after tooth extraction. Disruption of the orientation of the prosthetic plane and isolated replacement of structures only on the lower jaw caused complications in 15% of cases. In 20% of patients, dysfunction developed due to prolonged (10-15 years or more) use of prostheses, leading to pathological tooth erosion, deformation of the occlusive surface, and the formation of traumatic occlusion[14,15].

It is particularly noteworthy that joint complaints were noted in the anamnesis of 56% of the examined individuals, but ignoring these data during treatment planning led to decompensation of the condition. According to computed tomography data, in 85% of patients with post-prosthetic complications, asymmetry of joint fissures and dislocation of joint heads were identified, due to the loss of occlusion height and the retroposition of the lower jaw.

Conclusion

To prevent the development of pathologies, it is necessary to ensure a thorough medical history and mandatory clinical examination of the joint apparatus, supplemented by radiological diagnostics in the form of computed and magnetic resonance imaging, as well as orthopantomography and functional electromyography of the masticatory muscles. Particular attention should be paid to the detailed analysis of occlusive relationships and the patient's bite to exclude muscular parafunctions; at the same time, it is important to observe the regulation for a simultaneous increase in interalveolar height of no more than three and a half millimeters. The final stage of treatment should be timely and biologically justified prosthetics after tooth extraction to fully restore the integrity of the tooth series, which subsequently requires regular dynamic observation within the framework of annual preventive examinations.

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