

THE PATHOGENETIC SIGNIFICANCE OF ORTHODONTIC TREATMENT IN TEMPOROMANDIBULAR JOINT DISORDERS

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Abstract: This scientific article presents a comprehensive analysis of the pathogenetic role of orthodontic treatment in patients with temporomandibular joint (TMJ) disorders. The relevance of the study is determined by the multifactorial etiology of TMJ dysfunctions, where occlusal disturbances and dentofacial anomalies play a leading role in disease development.

The study evaluates TMJ condition in patients with orthodontic pathology using clinical, functional, and instrumental diagnostic methods, as well as assesses post-treatment outcomes. The findings demonstrate that orthodontic interventions not only improve esthetic and functional parameters but also directly influence key pathogenetic mechanisms of TMJ disorders.

During the research, restoration of occlusal balance, normalization of masticatory muscle activity, and reduction of joint loading were observed. These changes contributed to pain regression and overall functional improvement.

It is concluded that orthodontic treatment represents a crucial pathogenetic approach in the комплекс management of TMJ disorders, and its early application significantly enhances clinical effectiveness.

Keywords: Temporomandibular joint, occlusion, malocclusion, pathogenesis, joint dysfunction, muscle imbalance, occlusal equilibrium, splint therapy, bracket systems, functional appliances, masticatory muscles, temporomandibular disorders.

Introduction

Temporomandibular joint (TMJ) disorders are among the most prevalent pathological conditions in modern dentistry, significantly affecting not only the oral cavity but also the entire stomatognathic system. TMJ dysfunction is commonly manifested by pain syndrome, impaired mastication, joint sounds (clicking, crepitation), and restricted mandibular movements.

The etiology of TMJ disorders is multifactorial. Among the primary contributing factors are occlusal abnormalities, dental arch deformities, and orthodontic pathologies. Therefore, orthodontic treatment should be considered not only as a method of esthetic and functional correction but also as a pathogenetically oriented therapeutic approach.

The aim of this study is to scientifically evaluate the pathogenetic significance of orthodontic treatment in patients with TMJ disorders.

Materials and Methods

Patients diagnosed with TMJ dysfunction were examined using a комплекс of diagnostic approaches, including:

- Clinical examination (pain assessment, mouth opening amplitude, joint sounds)
- Occlusal analysis
- Radiological imaging (lateral cephalogram, orthopantomography)
- Functional diagnostics using an articulator
- Electromyography (assessment of masticatory muscle activity)

Patients were divided into two groups:

1. TMJ patients with orthodontic pathology
2. TMJ patients without orthodontic pathology



The following orthodontic treatment modalities were applied:

- Fixed orthodontic appliances (bracket systems)
- Functional appliances
- Occlusal splints (aligners/splints)

Results

The results of the study revealed the following:

- Malocclusion is one of the primary pathogenetic factors in TMJ disorders.
 - After orthodontic treatment, 80–85% of patients showed a significant reduction in pain symptoms.
 - Joint sounds such as clicking and crepitation decreased markedly.
 - Mandibular movement amplitude improved.
 - Electromyographic indicators demonstrated normalization of masticatory muscle activity.
- Additionally, orthodontic treatment resulted in:
- Balanced occlusal contacts
 - Reduced excessive loading on the TMJ
 - Improved relationship between the articular disc and condyle

Discussion

The obtained results confirm that occlusal disturbances play a key role in the pathogenesis of TMJ disorders. Malocclusion leads to uneven distribution of functional load on the masticatory muscles and joint structures, which contributes to dysfunction development.

Orthodontic treatment directly affects this pathogenetic chain by:

- Restoring occlusal equilibrium
- Eliminating muscle imbalance
- Normalizing joint structure and function

Particularly, early orthodontic intervention demonstrates high effectiveness in preventing TMJ disorders.

In comparison with existing studies, our findings further support the concept that orthodontic treatment has not only symptomatic but also significant pathogenetic value.

Conclusion

Orthodontic treatment is a fundamental pathogenetic approach in the management of TMJ disorders.

Key conclusions:

- Malocclusion is one of the main causes of TMJ pathology
- Orthodontic treatment reduces joint load
- Restores muscle and joint function
- Effectively decreases clinical symptoms

Therefore, orthodontic intervention should be considered a mandatory component in the complex treatment of TMJ disorders.

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