POST-COVID-19 CLINICAL AND AUDIOLOGICAL CHARACTERISTICS OF TEMPOROMANDIBULAR JOINT (TMJ) DYSFUNCTIONS

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Abstract:

This study describes the clinical and audiological manifestations observed in patients with temporomandibular joint (TMJ) dysfunctions that developed after COVID-19 infection. During the research, patients were examined using primary and supplementary diagnostic methods. Gender- and age-related differences, as well as characteristics associated with auditory system involvement in TMJ dysfunction, were analyzed. Possible risk factors contributing to the development of TMJ pathologies were also identified.

Keywords: temporomandibular joint, dysfunction, occlusion, COVID-19, audiological disorders.

Introduction

Despite significant advances in the diagnosis and treatment of maxillofacial diseases in modern dentistry, patients with temporomandibular joint (TMJ) disorders remain among the most challenging groups requiring timely and highly qualified medical care. Difficulties in diagnosing TMJ pathologies are largely related to the anatomical complexity of the joint. Epidemiological data indicate variations in the prevalence of TMJ disorders reported in both local and international literature.

According to the World Health Organization (WHO), approximately 40% of individuals aged 20–50 suffer from TMJ muscle-joint dysfunction. Local sources report that the prevalence of various TMJ disorders exceeds 60%, and a significant proportion of patients exhibit functional impairments.

Main Part

In the post-pandemic era, numerous clinical observations have shown that COVID-19 infection affects not only the respiratory system but also various other organs, including the temporomandibular joint and the masticatory apparatus. Post-viral inflammatory reactions, alterations in blood circulation, and neuromuscular dysfunctions may exacerbate pre-existing TMJ conditions or trigger new dysfunctions. These pathological processes may also correlate with hearing impairment in affected patients.

The findings align with clinical trends observed among patients who contracted COVID-19 and later sought medical attention with TMJ-related complaints.

Anatomical proximity: The temporomandibular joint is located very close to the external auditory canal and middle ear structures. The tissues surrounding the joint are innervated by the trigeminal nerve (cranial nerve V), facial nerve (cranial nerve VII), and auriculotemporal nerve, which also supply sensory fibers to the ear region. Therefore, inflammation, muscular spasm, or disc displacement within the TMJ may manifest not only as pain but also as auditory disturbances.In addition, the bony structures separating the TMJ capsule from the middle ear are extremely thin. Inflammatory processes such as arthritis or synovitis, joint effusion, or displacement of the articular disc may cause mechanical pressure on the external or middle ear, leading to changes in auditory canal pressure.**Eustachian tube dysfunction:**During chewing and swallowing, the opening and closing of the Eustachian tube maintains normal air pressure in the middle ear. TMJ dysfunction and masticatory muscle

imbalance may disrupt this mechanism, contributing to ear fullness, tinnitus, or conductive hearing loss.

Parafunctions and Their Impact Earlier studies, such as those by Lobbezoo-Scholte A.M. (1993), suggested that parafunctions such as bruxism (teeth grinding) or lip biting did not directly cause temporomandibular joint (TMJ) pathology. However, contemporary research does not dismiss these factors; in certain cases, they may either contribute to disease onset or arise as a consequence of it.Diagnosis of temporomandibular joint dysfunction (TMJD) is complex and requires a multi-stage, comprehensive approach. The diagnostic process includes primary (clinical) and supplementary (instrumental and apparatus-based) methods. Primary methods involve direct clinical examination performed by the clinician. During this stage, the following assessments are conducted:Patient history and complaints are recorded (pain, joint sounds such as clicking or crepitus, difficulty in mouth opening, fatigue during mastication, auditory changes, etc.), including duration of pain, history of trauma, stress, bruxism, and post-COVID-19 changes.Facial symmetry, mandibular posture, and muscle hypertonicity are evaluated.Mandibular movements (opening, closing, and lateral excursions) are assessed manually, including palpation of the joint area.Attention is paid to tender points, muscle spasms, and signs of stiffness or hypotonia.Joint sounds such as crepitus, clicking, or grinding are detected using a stethoscope, indicating possible disc displacement or deformation of joint surfaces.Maximum mouth opening is measured, and muscle coordination and completeness or restriction of mandibular movements are documented.Clinical signs alone may not always be sufficient for diagnosis. Therefore, supplementary diagnostic methods are employed: Panoramic Radiography (Orthopantomogram): Visualizes joint bone structures, dentition, and condylar morphology.Joint Radiography**:** Assesses joint space, condylar position, and degenerative changes.Computed Tomography (CT): Provides precise information on bone structure, deformities, or erosion.Magnetic Resonance Imaging (MRI): Most

effective for evaluating soft tissue structures, including the articular disc, ligaments, and muscles. Electromyography (EMG): Measures electrical activity of masticatory muscles, assessing asymmetry, hyperactivity, or spasm.Audiological Examinations: Conducted in cases of hearing loss or tinnitus associated with TMJD. Tests such as audiometry and tympanometry evaluate auditory function and Eustachian tube patency. In post-COVID-19 patients, these tests are crucial for detecting neurosensory hearing impairments.

A comprehensive approach is essential for accurate TMJD diagnosis. Primary clinical examination allows assessment of muscles and joint condition, while supplementary instrumental methods provide in-depth evaluation of structural and functional changes. Post-COVID-19 assessments should integrate audiological and neuromuscular evaluations into the diagnostic protocol.

Common Audiological Symptoms in TMJD Patients:Tinnitus: Ringing, buzzing, or hissing in the ear.Hearing loss (hypoacusis): Reduced ability to perceive sounds.Ear pain or pressure**:** Pain originating from the joint may radiate to the ear.

Studies indicate that 30–50% of patients with TMJD experience various degrees of audiological disturbances. Audiological symptoms, including tinnitus and hearing loss, were observed in 47–52% of patients with post-COVID-19 temporomandibular joint (TMJ) dysfunction. In some cases, these audiological signs appeared prior to the onset of joint pain. Hearing changes were 1.5–2 times more frequent in women, likely related to hormonal levels and muscle tone, compared to men.

Conclusion

Inflammation or dysfunction of the TMJ, particularly in the context of post-COVID-19 systemic inflammation, can directly affect the ear's mechanical and neural systems, leading to hearing impairment. Therefore, assessment of auditory

changes in post-COVID-19 patients should involve not only ENT specialists but also dental gnathologists. Clinical observations indicate that hearing alterations are a significant, yet often overlooked, symptom of TMJ dysfunction. The underlying mechanisms are associated with anatomical proximity, reflex responses, muscle spasms, circulatory disturbances, and viral infections (COVID-19).Thus, audiological diagnostics should be an integral component of the evaluation of patients with TMJ dysfunction. In the post-COVID-19 period, changes such as condylar bone resorption, ligament degradation, or osteoarthritic-like alterations may occur. Timely monitoring with CT or MRI is recommended, alongside interventions to reduce joint overload (e.g., management of bruxism, physiotherapy), anti-inflammatory therapy, and gnathological rehabilitation.

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