

# The Manifestations of Covid-19 Infection. Manifestations in Patients with Temporomandibular Joint Disorders

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**Abstract:** The authors present a group of patients who were treated for exacerbation of temporomandibular joint disorders (TMD) following Covid-19 infection and who in the past had successfully undergone surgery of the temporomandibular joint (TMJ). The group consisted in total of 21 patients who relapsed after contracting Covid-19. There were 4 men and 17 women, the average age was 45.6 years (28–63). The most common complaint was pain. In all cases, the pain was located in the preauricular area, 4 patients had pain in the lateral side of the neck, 1 patient had pain of the nasal alae. During clinical examination, pain was present on palpation of the masseter muscle (19 patients), temporal muscle (4 patients) and the TMJ area (4 patients). In 4 cases, pain on palpation was present in the area of the nape and sternocleidomastoid muscles. Treatment in all cases was the same: thermotherapy, muscle relaxation massage and non-steroidal anti-inflammatory drugs. Symptoms subsided in all cases within 2 weeks. In light of the Covid-19 pandemic, it is also necessary to expect an increased number of patients with TMD. The authors recommend targeted patient histories regarding Covid-19 infection when examining patients with TMD symptoms – this will certainly facilitate determining the etiology of the pain.

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## Introduction

Covid-19 infection was first reported in 2019 and during the following year became a worldwide pandemic. The disease is the result of infection by the SARS-CoV-2 coronavirus. Coronaviruses are RNA viruses classified as viruses that cause zoonotic infections. These respiratory viruses are transmitted mainly through contact with an infected person, specifically via droplets, infectious aerosols and contaminated objects and surfaces. Symptoms of Covid-19 infection most often include fever, dry cough, fatigue, shortness of breath, muscle and joint pain. Less common symptoms include nausea, pneumonia, cardiomyopathy, encephalitis and acute nephropathy (Feng et al., 2020; Huang et al., 2020; Li et al., 2020; Murat et al., 2021).

As of July 27<sup>th</sup> 2021, the number of Covid-19 cases reported worldwide was 194,723,719 (<https://coronavirus.jhu.edu/map.html>). At the time, 1,672,764 cases had been diagnosed in the Czech Republic (<https://koronavirus.mzcr.cz>).

Given that one of the symptoms of Covid-19 infection is involvement of the muscles and joints, the muscles of the head and jaw joint may also be affected (Asquini et al., 2021).

The aim of the study is to present a group of patients with chronic temporomandibular joint disorders (TMD), who underwent successful surgery but then experienced a deterioration in their condition following Covid-19 infection.

## Material and Methods

The study evaluated patients who were treated for exacerbation of TMD following Covid-19 infection who in the past had undergone temporomandibular joint (TMJ) surgery: arthroscopy, arthroplasty, or total joint replacement. Only patients undergoing successful surgery were included.

A requirement was that these patients experienced at least 6 entirely problem-free months before contracting Covid-19. The group only included patients who had undergone unilateral TMJ surgery and who then experienced unilateral problems after Covid-19 infection. All patients included in the study had mild cases of Covid-19 infection not requiring hospitalization.

The characteristics of the patients' complaints were assessed: location of pain, subjective pain value (visual analogue scale 0–10, VAS), opening of mouth (maximal interincisal opening, MIO). The area of the joint, masticatory muscles, nape muscles and sternocleidomastoid muscles were examined by palpation. All patients (with the exception of those with total replacements) underwent ultrasound of the TMJ to compare the width of the joint space on the symptomatic side with the other unaffected side (using the Mindray DP-50, 7.5 MHz device, Shenzhen Mindray Bio-medical Electronics).

## Results

The study included a total of 21 patients who had undergone TMJ surgery in the past and had experienced a relapse following Covid-19 infection. There were 4 men and 17 women, the average age was 45.6 years (28–63).

3 patients were originally diagnosed with Wilkes stage V (severe degenerative changes) – resulting in total joint replacement. 9 patients were originally diagnosed with Wilkes stage IV (disc dislocation, degenerative changes) – resulting in arthroscopic lysis and lavage (7 patients) and discectomy using subsequent free fat flap insertion (2 patients). 9 patients were originally diagnosed with Wilkes stage III (disc dislocation without repositioning) – resolved in all cases by arthroscopic lysis and lavage.

All patients had undergone surgery at least one year previously (mean of 14 months) and had been pain-free (mean VAS 0.25) and without limited jaw mobility (mean MIO 35.8 mm) for at least 6 months.

On average, these patients came in for treatment of TMJ problems 2 months after contracting Covid-19 (interval 1–8 months).

Pain was the dominant complaint.

The subjective pain value (VAS) was 4.5 (2–8). The VAS for these patients at the last check-up before Covid-19 infection was 0.25 (0–1).

In all cases, the patients reported pain in the preauricular area (5 patients concurrently reported ear pain, 8 patients reported toothache, 4 patients reported pain of the lateral side of the neck and 1 patient reported pain of the nasal alae).

During clinical examination, pain was present on palpation of the masseter muscle (19 patients), temporal muscle (4 patients) and the TMJ area (4 patients). In 4 cases, pain was present on palpation of the nape and sternocleidomastoid muscle.

In 18 patients, pain was also present in other joints and muscle groups of the body.

Jaw mobility was limited, MIO was 28.40 mm (25–38 mm). MIO in these patients at the last check-up before Covid-19 infection was 35.8 mm (30–47 mm).

### *Ultrasound of TMJ*

4 patients were found to have a widening of the joint space on the affected side compared to the unaffected side.

In other patients, there was no widening of the joint space and no signs of effusion.

Treatment was the same in all cases: thermotherapy (application of dry heat 3× daily), muscle relaxation massage (several times daily) and non-steroidal anti-inflammatory drugs (Nalgesin 275 mg, naproxenum natricum 275 mg, Krka, Slovenia – 3 days 1 dose every 8 hours, 3 days every 12 hours). Within 2 weeks, the problems subsided in all cases. In the 4 patients where ultrasound revealed widening of the joint space, this disappeared after 2 weeks of treatment.

## Discussion

The most common symptoms of Covid-19 infection include fever, dry cough, fatigue, shortness of breath and muscle and joint pain. In a meta-analysis, myalgia was the most common musculoskeletal symptom with a prevalence of 30–36% and headache was the most common neurological symptom with a prevalence of 58.33% among Covid-19 patients (Feng et al., 2020; Huang et al., 2020). In their retrospective study, Murat et al. (2021) assessed 210 patients with Covid-19, where pain was present in 69.3% (133 patients). 92 patients (69.2%) experienced myalgia/arthralgia, 67 patients (50.4%) headache, 58 patients (43.6%) back pain, 44 patients (33.1%) lower back pain, 33 patients (25.0%) chest pain, 28 patients (21.1%) sore throat, and 18 patients (13.6%) abdominal pain. Chronic pain and fatigue have been observed after contracting Covid-19 (Moldofsky and Patcai, 2011). The predominant clinical symptoms in the present work were muscle pain, while objective changes in the TMJ (widening of the joint space confirmed by ultrasound) were only noted in 4 patients. 18 patients reported pain in multiple joints and muscle groups.

Covid-19 apparently affects the area of the jaw joint and masticatory muscles in two ways.

The first involves overexpression of proinflammatory cytokines, which affect the tissues of the masticatory muscles and synovial membrane of the TMJ. This leads to muscle and joint pain. At the same time, cytokines act in the cerebrospinal fluid, stimulating neurons of the trigeminal ganglia to produce calcitonin gene-related peptide (which plays a key role in migraines and affects arterial dilatation). This leads to headaches (Drożdżal et al., 2020).

Another effect of Covid-19 infection on joint structures and masticatory muscles is indirect and involves mental disorders and stress. Anxiety and depression are both consequences of Covid-19 infection. This is related to restricted physical activity due to forced quarantine, fear of infection, lack of information, financial loss, disruption of routine habits and loss of social contact (Drożdżal et al., 2020; Medeiros et al., 2020). Stress load is also increased by the fact that in many cases during the pandemic health care was limited and help and therapy were not provided soon enough (Drożdżal et al., 2020). Such stress results in a higher level of sympathetic activity and greater release of adrenocortical steroids (Almeida-Leite et al., 2020). Increased stress leads to poorer CNS (central nervous system) regulation of the prefrontal area of the cerebral cortex which regulates behaviour, thoughts and emotion, including inhibition of inappropriate motor reactions. Pathways in the hypothalamus and brain stem are activated (Quadri et al., 2015). This leads to an increase in parafunctional activity (clenching of teeth, maintaining the jaw in a rigid position, pressing of the tongue on teeth, playing with tongue on lips and cheeks). Polmann et al. (2019) report a 6× higher risk of sleep bruxism in patients with depression and anxiety. These parafunctional activities lead to repeated contraction of the masticatory muscles, muscle overexertion, local ischemia and muscle pain (Medeiros et al., 2020).

One must also consider the fact that patients with chronic TMD are more prone to experience pain and stress after Covid-19 infection (Asquini et al., 2021). This risk group includes the patients in our study, who all suffered from chronic TMD.

Patients with pain of the masticatory muscles and TMJ following Covid-19 infection can be successfully treated with physical therapy, thermotherapy and NSAIDs (non-steroidal anti-inflammatory drugs) (Drożdżał et al., 2020), as shown by this study as well.

## Conclusion

In light of the Covid-19 pandemic it is necessary to expect an increased number of patients with TMD. The authors recommend targeted patient histories regarding Covid-19 infection when examining patients with TMD symptoms – this will certainly facilitate determining the etiology of the pain. One drawback of this study is, understandably, the small number of patients. The symptoms presented and therapy of these complications should therefore be taken as a guide and not an unequivocal recommendation. These will undoubtedly arise in the future from a larger and preferably multicenter study.

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