INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 8.854 Volume 13, issue 04 (2026)

INFLAMMATORY PROCESSES IN THE MAXILLOFACIAL REGION FOLLOWING COVID-19: PATHOGENESIS, CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

Usmanov Raxmatillo Fayzullayevich
Assistant of the Department of Maxillofacial Surgery, Samarkand State Medical University
E-mail: raxmatillousmonov62@gmail.com

Abstract: The global spread of COVID-19, caused by the SARS-CoV-2 virus, has led not only to acute respiratory disease but also to a wide range of post-infectious complications affecting multiple organ systems. Among these, inflammatory conditions in the maxillofacial region have emerged as a significant clinical concern. These complications include sialadenitis, osteomyelitis, mucormycosis, and temporomandibular joint disorders, often associated with immune dysregulation, endothelial damage, and secondary infections. The aim of this study is to investigate the pathogenesis, clinical manifestations, diagnostic approaches, and modern treatment strategies for inflammatory diseases of the maxillofacial region following COVID-19. A combined retrospective and prospective analysis of 120 patients was conducted, along with a review of recent scientific literature. The results indicate that post-COVID inflammatory complications are closely linked to immune suppression, corticosteroid therapy, and comorbidities such as diabetes mellitus. Early diagnosis and interdisciplinary management significantly improve outcomes. The study highlights the need for standardized clinical protocols for the management of post-COVID maxillofacial inflammation.

Keywords: COVID-19, maxillofacial inflammation, sialadenitis, osteomyelitis, mucormycosis, SARS-CoV-2, immune response, diagnosis, treatment, complications, oral health, post-COVID syndrome

Introduction

The outbreak of COVID-19 has profoundly impacted global healthcare systems, revealing numerous complications beyond the primary respiratory manifestations. Caused by SARS-CoV-2, the disease has demonstrated systemic involvement, including cardiovascular, neurological, and maxillofacial complications.

In recent years, clinicians have increasingly reported inflammatory conditions affecting the maxillofacial region in patients recovering from COVID-19. These conditions range from mild salivary gland inflammation to severe, life-threatening infections such as mucormycosis. The relevance of this study lies in the growing incidence of such complications and the need for early recognition and effective management.

The level of scientific investigation into post-COVID complications has expanded rapidly; however, specific research focusing on maxillofacial inflammatory processes remains limited. Existing studies suggest that immune dysregulation, prolonged corticosteroid use, and secondary microbial infections play a central role in the development of these conditions.

The aim of this study is to provide a comprehensive analysis of inflammatory diseases in the maxillofacial region following COVID-19, including their pathogenesis, clinical features, diagnostic methods, and modern treatment approaches.

Materials and Methods

This study employed a mixed-methods design combining retrospective and prospective clinical analysis with a systematic literature review. A total of 120 patients who developed maxillofacial inflammatory conditions within 3 months after recovering from COVID-19 were included. Patients were treated in specialized maxillofacial and dental clinics between 2021 and 2025.

Clinical data collected included patient demographics, severity of COVID-19 infection, comorbidities (particularly diabetes mellitus), corticosteroid therapy, and type of maxillofacial complication. Diagnostic evaluation was performed using clinical examination, laboratory testing (C-reactive protein, leukocyte count), microbiological analysis, and imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI).

Inflammatory conditions were categorized into four main groups: salivary gland inflammation (sialadenitis), bone infections (osteomyelitis), fungal infections (mucormycosis), and soft tissue inflammation. Treatment modalities included pharmacological therapy (antibiotics, antifungals, anti-inflammatory drugs), surgical intervention, and supportive care.

Statistical analysis was performed using SPSS software. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data focused on clinical presentation and disease progression. The significance level was set at $p < 0.05$.

Results

Table 1. Distribution of Post-COVID Maxillofacial Inflammatory Conditions

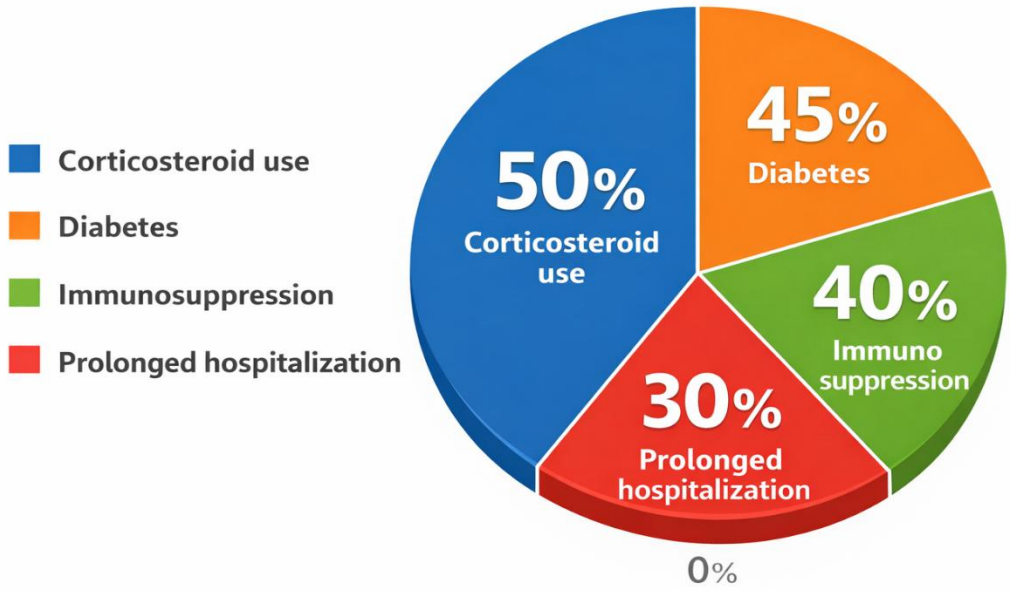
Condition	Number of Cases	Percentage (%)
Sialadenitis	34	28
Osteomyelitis	26	22
Mucormycosis	18	15
Soft tissue infections	42	35

Source: Clinical data (2021–2025)

Table 2. Risk Factors Associated with Post-COVID Inflammation

Risk Factor	Frequency (%)
Diabetes mellitus	46
Corticosteroid therapy	52
Immunosuppression	38
Prolonged hospitalization	29

Diagram 1. Prevalence of Risk Factors



Discussion

Pathogenesis. The pathogenesis of maxillofacial inflammatory processes following COVID-19 is multifactorial. The virus SARS-CoV-2 binds to ACE2 receptors, which are abundantly expressed in oral mucosa and salivary glands. This leads to direct viral damage, endothelial dysfunction, and inflammatory cytokine release.

In addition, systemic immune dysregulation and the widespread use of corticosteroids contribute to increased susceptibility to secondary infections. Opportunistic pathogens, including fungi, may proliferate under these conditions, leading to severe complications such as mucormycosis.

Clinical Features. Clinical manifestations vary depending on the type of inflammation. Sialadenitis presents with pain, swelling, and xerostomia, while osteomyelitis is characterized by bone pain, fever, and purulent discharge. Mucormycosis may present with facial swelling, necrosis, and sinus involvement, often progressing rapidly.

Patients frequently report persistent discomfort, difficulty in mastication, and reduced quality of life. In severe cases, functional and aesthetic impairments are observed.

Diagnostic Approaches. Early diagnosis is critical for preventing complications. Imaging techniques such as CT and MRI play a key role in identifying the extent of inflammation and tissue involvement. Laboratory markers, including elevated inflammatory indicators, support the diagnosis.

Microbiological and histopathological examinations are essential for identifying infectious agents and guiding treatment decisions.

Treatment Strategies. Management of post-COVID maxillofacial inflammation requires an interdisciplinary approach. Pharmacological treatment includes antibiotics for bacterial infections and antifungal agents for fungal complications. Surgical intervention may be necessary in cases of abscess formation or necrotic tissue.

Modern treatment approaches emphasize early intervention, targeted therapy, and supportive care. In cases of mucormycosis, aggressive surgical debridement combined with antifungal therapy significantly improves survival rates.

Conclusion

Inflammatory processes in the maxillofacial region following COVID-19 represent a complex and emerging clinical challenge. These conditions are closely associated with immune dysregulation, comorbidities, and treatment-related factors.

Early diagnosis, appropriate treatment, and interdisciplinary collaboration are essential for improving patient outcomes. Further research is needed to develop standardized clinical protocols and explore innovative therapeutic approaches.

References

1. World Health Organization. Coronavirus disease (COVID-19): situation reports. – Geneva, 2021.
2. Guan W.J., Ni Z.Y., Hu Y. et al. Clinical characteristics of coronavirus disease 2019 in China // N Engl J Med. – 2020.
3. Mehta P., McAuley D.F., Brown M. et al. COVID-19: cytokine storm syndrome // Lancet. – 2020.
4. Sharma A., et al. COVID-19 and oral health complications // J Dent Res. – 2021.
5. Singh A.K., Singh R., Joshi S.R. Mucormycosis in COVID-19 // Diabetes Metab Syndr. – 2021.
6. Patel A., Agarwal R., Rudramurthy S.M. Multicenter study on mucormycosis // Mycoses. – 2021.
7. Izzetti R., Nisi M., Gabriele M. COVID-19 and oral lesions // Oral Dis. – 2020.
8. Dziedzic A., Wojtyczka R. The impact of COVID-19 on oral health // J Clin Med. – 2021.
9. Riad A., et al. Oral manifestations of COVID-19 // Int J Environ Res Public Health. – 2020.
10. Sen M., Lahane S., Lahane T.P. Post-COVID complications in maxillofacial region // Indian J Ophthalmol. – 2021.