

Treatment Algorithm for Orofacial Mucormycosis



In the Indian second wave of the COVID-19 pandemic, India witnessed a huge number of infections per day, peaking in May 2021, with the country reporting more than 4 lakh cases per day. This led to serious medical emergencies in parts of the country, crushing the existing medical infrastructure. There was unprecedented demand for oxygen and medical supplies including Remdesivir. The emergence of new variants of COVID-19 and reduction in COVID-19 appropriate social behavior since February 2021 had possibly fuelled the second wave of COVID-19.^[1,2]

Also, in this wave, a large number of fungal infections were reported.^[3-7] These infections, particularly mucormycosis, caused huge mortality and morbidity.^[8] The cause for the spurt in fungal infections has been attributed to the use of steroids, possibility of altered blood sugar levels and persistently increased pro-inflammatory markers, such as IL-1, IL-6 and Tumour Necrosis Factor Alpha in COVID-19 patients. Also, they have relatively less CD4 interferon-gamma expression, fewer CD4 and CD8 cells. Though the cause is varied, there are numerous reports of these fungal infections. There are newspaper reports indicating more than 11,700 cases of mucormycosis alone in India during this second wave.^[10] There has also been a report of non-availability of Amphotericin-B in certain parts of the country.

Irrespective of the conditions and forms, mucormycosis of the orofacial region presents as a swelling, painful ulcer or nodule of the jaw bones, sinus and noticeably at the gingiva. If left untreated or under-diagnosed, or late diagnosed, the lesion would undergo a rapid course, destroying all midfacial bone and probably invade the vascular channels to reach the orbit or lungs. When they reach these critical sites, removal of the eye or the affected organs are the only source of treatment.^[11]

The treatment algorithm for orofacial mucormycosis is very simple. Early diagnosis is the key.^[12,13] Though antifungals such as Amphotericin-B are effective in controlling the spread of the disease, they cannot offer much relief to already infected and necrotized bone. In this situation, the only way to treat is aggressive debridement of the involved areas. Depending on the site – maxilla or mandible, fresh bleeding should be induced. Surgeon should not hesitate to remove dead and necrotic bone. When facing the crucial decision of saving certain parts for future reconstruction, surgeon should not

hesitate to remove all offending and affected bone. Leaving back necrotized bone, though under antifungal cover, still predisposes to re-infection. Surgeons must consider the fact that there are plenty of options to recreate a critical sized defect of maxilla and mandible. They could rehabilitate the latter with advanced plates, grafts, and implants and other methodologies can be utilized to recreate lost form and function.^[14,15]

With the number of COVID-19 cases plummeting, the effect of the viral infection, known as long-term COVID-19 will soon manifest. Oral Surgeons should be ready to meet the wave of aggressive orofacial fungal infections and possible reconstruction. There might be some hesitancy among surgeons regarding the residual presence of such fungal organisms in the operation theatre. This can be eradicated by following proper operation theatre disinfection protocol.^[16,17]

The diagnosis and rehabilitation challenge in severe orofacial mucormycosis would be on the rise due to this second wave of COVID-19 and the oral surgeon community should shoulder the responsibility for early diagnosis, better treatment and later, appropriate reconstruction so that the quality of life would be better.

S. M. Balaji

Department of Oral and Maxillofacial Surgery,
Balaji Dental and Craniofacial Hospital, Chennai,
Tamil Nadu, India.
E-mail: smbajali@gmail.com

Received: 14-04-2021

Accepted: 30-04-2021

Published: 24-07-2021


REFERENCES

1. Thiagarajan K. Why is India having a covid-19 surge? *BMJ*. 2021 Apr 30;373:n1124. doi: 10.1136/bmj.n1124. PMID: 33931413.
2. Samarasekera U. India grapples with second wave of COVID-19. *Lancet Microbe*. 2021 Jun; 2 (6):e238. doi: 10.1016/S2666-5247 (21) 00123-3. Epub 2021 Jun 2. PMID: 34100006; PMCID: PMC8172167.
3. Evert K, Dienemann T, Brochhausen C, Lunz D, Lubnow M, Ritzka M, Keil F, Trummer M, Scheiter A, Salzberger B, Reischl U, Boor P, Gessner A, Jantsch J, Calvisi DF, Evert M, Schmidt B, Simon M. Autopsy findings after long-term treatment of COVID-19 patients with microbiological correlation. *Virchows Arch*. 2021 Jan 20:1–12. doi: 10.1007/s00428-020-03014-0. Epub ahead of print. PMID: 33471172; PMCID: PMC7816067.

4. Balaji S M. Post COVID-19 fungal and microbial infections. *Indian J Dent Res* 2020;31:669
5. Sai Krishna D, Raj H, Kurup P, Juneja M. Maxillofacial Infections in Covid-19 Era-Actuality or the Unforeseen: 2 Case Reports. *Indian J Otolaryngol Head Neck Surg.* 2021 May 17;1-4. doi: 10.1007/s12070-021-02618-5. Epub ahead of print. PMID: 34026593; PMCID: PMC8127475.
6. Rajendra Santosh AB, Muddana K, Bakki SR. Fungal Infections of Oral Cavity: Diagnosis, Management, and Association with COVID-19. *SN Compr Clin Med.* 2021 Mar 27;1-12. doi: 10.1007/s42399-021-00873-9. Epub ahead of print. PMID: 33817556; PMCID: PMC8003891.
7. Riad A, Gomaa E, Hockova B, Klugar M. Oral candidiasis of COVID-19 patients: Case report and review of evidence. *J Cosmet Dermatol.* 2021 Jun; 20 (6):1580-1584. doi: 10.1111/jocd. 14066. Epub 2021 Mar 21. PMID: 33713390
8. Khurana S, Singh P, Sharad N, Kiro VV, Rastogi N, Lathwal A, Malhotra R, Trikha A, Mathur P. Profile of co-infections and secondary infections in COVID-19 patients at a dedicated COVID-19 facility of a tertiary care Indian hospital: Implication on antimicrobial resistance. *Indian J Med Microbiol.* 2021 Apr; 39 (2):147-153. doi: 10.1016/j.ijmmb. 2020.10.014. Epub 2020 Nov 2. PMID: 33966856; PMCID: PMC7667411.
9. Singh AK, Singh R, Joshi SR, Misra A. Mucormycosis in COVID-19: a systematic review of cases reported worldwide and in India. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews.* 2021 May 21.
10. <https://timesofindia.indiatimes.com/india/covid-19-shortage-of-black-fungus-drug-looming/articleshow/83079300.cms> Last accessed on 15 June 2021
11. Honavar SG. Code Mucor: Guidelines for the Diagnosis, Staging and Management of Rhino-Orbito-Cerebral Mucormycosis in the Setting of COVID-19. *Indian J Ophthalmol.* 2021 Jun; 69 (6):1361-1365. doi: 10.4103/ijo.IJO_1165_21. PMID: 34011699.
12. Patel A, Kaur H, Xess I, Michael JS, Savio J, Rudramurthy S, Singh R, Shastri P, Umabala P, Sardana R, Kindo A. A multicentre observational study on the epidemiology, risk factors, management and outcomes of mucormycosis in India. *Clinical Microbiology and Infection.* 2020 Jul 1;26 (7):944-e9.
13. Chakrabarti A, Singh S. Management of Mucormycosis. *Current Fungal Infection Reports.* 2020 Sep 29:1-3.
14. Balaji SM. Protein-signaled guided total jaw regeneration in infantile total mandibular resection. *Ann Maxillofac Surg.* 2014 Jul-Dec; 4 (2):198-200. doi: 10.4103/2231-0746.147141. PMID: 25593874; PMCID: PMC4293845.
15. Balaji SM. To distract or not to distract. *Ann Maxillofac Surg.* 2013 Jul; 3 (2):113. doi: 10.4103/2231-0746.119210. PMID: 24205469; PMCID: PMC3814658.
16. Caggiano G, Diella G, Triggiano F, Bartolomeo N, Apollonio F, Campanale C, Lopuzzo M, Montagna MT. Occurrence of Fungi in the Potable Water of Hospitals: A Public Health Threat. *Pathogens.* 2020 Oct; 9 (10):783.
17. Inkster T, Weinbren M. Water springing to life the fungal desert. *Journal of Hospital Infection.* 2021 May 1;111:65-8.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online

Quick Response Code: 	Website: www.amsjournal.com
	DOI: 10.4103/ams.ams_98_21

How to cite this article: Balaji SM. Treatment algorithm for orofacial mucormycosis. *Ann Maxillofac Surg* 2021;11:1-2.