



# An epidemic within a pandemic

Niladri Banerjee<sup>1</sup>, Anannya Ray Banerjee<sup>2</sup>, Harshita Agarwal<sup>3</sup>  
and Harshit Agarwal<sup>4</sup> 

With the evolution of COVID-19, more and more associated complications are unfolding. In addition to the disease process, associated comorbidity (viz. diabetes mellitus, chronic obstructive pulmonary disease) and immunosuppressive conditions (viz. corticosteroid therapy, ventilation, intensive care unit stay) make patients prone to severe opportunistic infections.<sup>1</sup> These may lead to oropharyngeal candidiasis, *Pneumocystis jirovecii* pneumonia and pulmonary aspergillosis.<sup>2</sup> However, recently in India, the incidence of mucormycosis is rising at an alarming rate, both as a co-infection and as a sequela of COVID-19. Many states in India declared it an epidemic and >28,000 cases have been reported by 7 June 2021, of whom 86% had a history of COVID-19 co-infection. The states of Maharashtra and Gujarat are the worst affected, contributing to 42% of the cases.<sup>3</sup> Sensitisation of all COVID care personnel regarding mucormycosis is now mandatory.

Mucormycosis is a fungal emergency that has a propensity for aggressive spread and is associated with a poor prognosis. Its risk factors in a COVID patient imply an immunocompromised state, typically uncontrolled diabetes, post-renal transplantation, or just a history of steroid administration for severe COVID-19 infection. The use of immunomodulatory drugs such as tocilizumab also increases the risk of infection. Mucormycosis can affect the lungs, intestines, open wounds in the extremities, the face or the brain. The surge in India is, however, predominantly of rhino-orbito-cerebral mucormycosis (ROCM), whose spectrum ranges from small lesions to destruction of the eyeball and cavernous sinus thrombosis. It has been suggested that this increased incidence of ROCM may be due to increased requirements of oxygen supplementation in patients with COVID-19, thus leading to a drying out of the nasopharyngeal mucosa. Diabetes mellitus is found in 62.3% of ROCM cases in India.<sup>3</sup> Corticosteroids, of course, act as immunosuppressants but also lead to deranged glucose tolerance, thus doubly contributing to mucormycosis. Furthermore, recent evidence is that COVID-19 can itself destroy

β-cells of the pancreas, leading to new-onset hyperglycaemia.<sup>4</sup>

The successful management of ROCM depends upon its early identification in patients with risk factors, and initiation of prompt effective treatment which may mean a multidisciplinary team approach. Simple tests for vision, pupil and ocular motility and examination for sinus tenderness, proptosis, palpebral oedema and palatal eschars, should become part of routine physical evaluation of all COVID-19 patients hospitalised with moderate to severe infection (especially those taking systemic corticosteroids, diabetics and those on prolonged oxygen support). In the initial stages, there may be features of cellulitis or oedema with blackening of tissues, later owing to cell death. Features such as diplopia, visual loss, headache, convulsions, altered mental status, cranial nerve palsy or gait disturbances suggest cerebral involvement.

A nasal swab for potassium hydroxide mount and culture is necessary. Treatment involves the use of liposomal amphotericin B and/or posaconazole together with endoscopic or open sinus debridement. The mortality rate of ROCM remains high (50% even in hospitalised patients),<sup>5</sup> particularly in the elderly, where there is cerebral involvement, and in patients already admitted to intensive care units.<sup>6</sup>

Since fungal infections develop during the middle and later stages of COVID-19 infection, follow-up of high-risk patients recovering from this infection is also

<sup>1</sup>Assistant Professor, Department of General Surgery, AIIMS, Jodhpur, India

<sup>2</sup>Medical Writer, Technology Healthcare Big Data Analytics (THB), Gurugram, India

<sup>3</sup>Senior Resident, Department of Pathology SGPGI, Lucknow, India

<sup>4</sup>Assistant Professor, Department of Trauma & Emergency, AIIMS, Raebareli, India

#### Corresponding author:

Harshit Agarwal, Department of Trauma & Emergency AIIMS, Raebareli, India.

Email: harsh.agarwal44@gmail.com

important. Immediate attention is called for if periorbital swelling, double vision, unilateral facial or orbital pain or headache ensue.

#### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

#### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

#### ORCID iD

Harshit Agarwal  <https://orcid.org/0000-0002-6658-9626>

#### References

1. Sarkar S, Gokhale T, Choudhury SS, et al. COVID-19 and orbital mucormycosis. *Indian J Ophthalmol* 2021; 69: 1002–1004.
2. Salehi M, Ahmadikia K, Badali H, et al. Opportunistic fungal infections in the epidemic area of COVID-19: a clinical and diagnostic perspective from Iran. *Mycopathologia* 2020; 185: 607–611.
3. [www.livemint.com/news/india/black-fungus-28-states-see-28-252-mucormycosis-cases-maharashtra-gujarat-among-worst-hit-states-11623069135171.html](http://www.livemint.com/news/india/black-fungus-28-states-see-28-252-mucormycosis-cases-maharashtra-gujarat-among-worst-hit-states-11623069135171.html) (accessed 16 August 2021).
4. Steenblock C, Richter S, Berger I, et al. Viral infiltration of pancreatic islets in patients with COVID-19. *Nat Commun* 2021; 12: 3534.
5. Camara-Lemmaroy CR, González-Moreno EI, Rodríguez-Gutiérrez R, et al. Clinical features and outcome of mucormycosis. *Interdiscip Perspect Infect Dis* 2014; 2014: 562610.
6. Patel A, Agarwal R, Rudramurthy SM, et al. Multicenter epidemiologic study of coronavirus disease-associated Mucormycosis, India. *Emerg Infect Dis* 2021; 27(9): 2349–2359.