

Rhino-orbito-cerebral mucormycosis causing cranial nerve abscess in post-COVID-19 status

Kritika Sharma,¹ Tapendra Tiwari,² Saurabh Goyal,² Rajaram Sharma ²

¹Radiodiagnosis, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India

²Radiodiagnosis, Pacific Institute of Medical Sciences Umarda Campus, Udaipur, India

Correspondence to

Dr Rajaram Sharma;
hemantgalaria13@gmail.com

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DESCRIPTION

Perineural extension of fungal infection is a rare complication that had been observed in post-COVID-19 immunocompetent mucormycosis patients during this pandemic. Rhino-orbito-cerebral mucormycosis is an opportunistic fungal infection caused by members of family Mucoraceae. Mucormycosis proved to be the lethal disease in untreated patients with diabetes or patients on immunosuppressive therapy with the same pattern of spread and severity.^{1 2} Rhino-orbito-cerebral mucormycosis has been declared endemic by the Indian government recently. Due to the aggressive pattern of spreading in this disease, it rapidly involves the surrounding structures. Cerebral extension of the organism occurs either by direct extension, haematogenous route or perineural spread. Over 2 months, we have observed nine patients with perineural spread involving cranial nerves during this endemic. The peculiar imaging findings in a perineural spread include thickened nerves with abnormal enhancement and perineural fat stranding. Initially, the enhancement in the

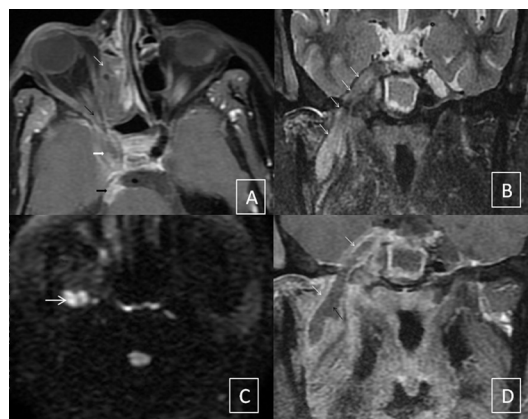


Figure 1 (A) T1-weighted fat-saturated (T1W FS) postcontrast, axial image shows heterogenous enhancement in the right ethmoid sinus (white arrow), orbital apex (black arrow), extending to right cavernous sinus (thick white arrow) and then till fifth nerve nucleus (thick black arrow). (B) Short tau inversion recovery) image in the coronal plane shows abnormally increased signals along the right mandibular nerve (white arrows). (C) Diffusion-weighted image in the axial plane depicts restricted diffusion in the mandibular nerve (white arrow). (D) T1W FS postcontrast image in coronal plane demonstrates peripheral enhancement (white arrows) with central liquefied non-enhancing collection (black arrow) along mandibular nerve passing through foramen ovale.

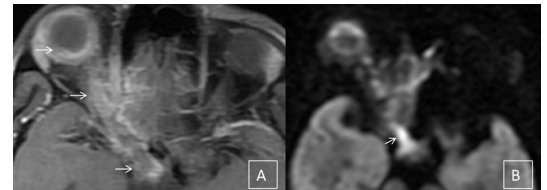


Figure 2 (A) T1-weighted fat-saturated postcontrast, axial image shows contiguous involvement of the preseptal soft tissue, eye globe and optic nerve up to the optic chiasma on the right side (white arrow). (B) The path of spread can also be evaluated on a diffusion-weighted image (white arrow).

affected nerve represents neuritis. However, it can progress into a full-blown abscess. The trigeminal nerve is a large cranial nerve with a unique course that enables us to easily demonstrate this evolution line. MRI stands to be the best diagnostic and non-invasive imaging technology that produces three-dimensional detailed anatomical images that help determine disease spreading with treatment.¹ This article highlights the role of MRI in the diagnosis of perineural complications observed in rhino-orbito-cerebral mucormycosis.

Here, we present two representative cases of a 55-year-old woman and a 60-year-old man who presented to our hospital with facial pain, facial numbness and high-grade fever. On initial examination, periorbital soft tissue swelling and facial redness were found with a history of hospitalisation for COVID-19 pneumonitis in the recent past. The patients were administered steroids during the previous hospital stay. On relevant laboratory investigations, both the patients had deranged blood glucose levels.

The patients underwent an MRI of the paranasal sinuses and brain, revealing orbital cellulitis, pansinusitis, abnormal signals in the premaxillary skin, retro-antral fat and masticator space extending to the right cavernous sinus (figure 1A).

The inferior turbinates and paranasal sinuses also had non-enhancing areas on postcontrast MRI, representing necrosis. In the first patient, the mandibular division of the right trigeminal nerve was thickened and showed heterogeneous signals on all MRI sequences (figure 1B). The diffusion-weighted image (DWI) image showed diffusion restriction in the abscess in the nerve (figure 1C). On postcontrast, T1 fat-suppressed images, the nerve revealed peripheral enhancement with central liquefied non-enhancing collection, represented an abscess (figure 1D).

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Patient's perspective

Patient 1—I feel unfortunate to have this disease. The doctors are trying their best to save my life. I need to be courageous and hopeful and I am trying for that. I feel ok to share my disease findings with the doctor community (some sort of publication in their language).

Patient 2—I feel frustrated as I got COVID-19 infection during the pandemic and then this fungal infection in this endemic. My eye cannot be saved and this feels horrible, but doctors are hopeful that after removing my eye, my condition will improve. I feel doctors should be made aware of such rare diseases. They need to publish more such cases.

Learning points

- ▶ An emergency CT scan should be performed to access invasive rhinosinusitis in patients with immunosuppressed or uncontrolled diabetes presenting with symptoms limited to paranasal sinuses. If there is a suspicion of central nervous system (CNS) or orbital involvement, MRI stands to be the ideal imaging modality.
- ▶ If any of these modalities raises suspicion for rhino-orbito-cerebral mucormycosis, immediate biopsy and antifungal treatment must be started. Even if the first biopsy comes negative for fungal elements and imaging shows typical findings, the condition should still be treated as invasive fungal sinusitis and a second biopsy should be performed.
- ▶ Nerve abscess is an extremely uncommon entity, can only be diagnosed if the radiologist is familiar with the pathology and has a high suspicion. MRI is the ideal diagnostic tool for this pathology that also helps in accessing the disease progression.

In another similar patient, there was the involvement of the preseptal soft tissue, eye globe and optic nerve up to the optic chiasma on the right side (figure 2A) and the path of spread was seen extending along the optic nerve on a DWI (figure 2B).

There are very few documented cases available in the literature describing the perineural spread of fungal infection, especially after this COVID-19 era; however, similar cases have been reported previously in patients with uncontrolled diabetes by Galletti *et al.*¹ A surgical biopsy from the inferior turbinate was done, which revealed non-septate fungal hyphae. Both the patients managed with antifungal drugs; however, they did not improve much. Both the patients were receiving treatment in our hospital till the writing of this article.

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ORCID iD

Rajaram Sharma <http://orcid.org/0000-0003-1126-5875>

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