



IMAGING OF RHINOCEREBRAL MUCORMYCOSIS

Radiology

**Anand Sorikunte
Huchappa***

Professor Of Radio Diagnosis. *Corresponding Author

**Vineetha Kolar
Venkataravanappa**

Associate Professor Of General Medicine.

ABSTRACT

Background: Rhinocerebral mucormycosis is a dangerous fungal infection seen predominantly in immune-compromised patients. Many cases were detected and treated during the Second wave of the COVID-19 pandemic. In this case series, we are describing the imaging findings of the Rhinocerebral mucormycosis. **Materials And Methods:** A retrospective descriptive study of 46 cases done in Sree Siddhartha medical college, Tumkur, Karnataka, India, CT and MRI images are reviewed, analyzed and documented. **Results:** CT and MRI images of 46 post COVID -19 patients showed involvement of the sinuses with extension to orbit, face and central nervous system. Two cases showed intracranial extension. The contrast images delineated the extent of the disease. Significant bony erosions were seen in most of the patients. **Conclusion:** Contrast CT and MRI scans showed the spectrum of findings in Rhinocerebral mucormycosis to describe the extent of the disease and its complications.

KEYWORDS

Mucormycosis, Black turbinate, Covid -19 infection.

INTRODUCTION

Rhino cerebral mucormycosis is a saprophytic fungal infection noted in immuno-compromised patients. The described fungi belong to the genera mucor, rhizopus & absidia. The fungal infections in immuno-compromised patients are due to abnormal phagocytic activity resulting in the loss of a normal barrier against the disease.^{1,2} Patients with mucormycosis presents with headache, fever, facial pain, retro-orbital pain, nasal obstruction, discharge and crusting. The disease progress rapidly with the involvement of the cranial nerve roots and also optic nerve.^{3,4,5} Early imaging is helpful for the diagnosis of the disease. In the later part of the disease, imaging helps in knowing the extent of the disease and the follow-up of the treatment.

OBJECTIVES:

The case series describes the early and late imaging findings of mucormycosis with the pattern of involvement and progression of the disease.

MATERIALS AND METHODS:

We collected retrospective data from the diagnosed and confirmed cases of mucormycosis from the period of January 2021 to June 2021. Images acquisition of these cases was done in 16 slice Toshiba, Alexion CT scan machine with 3mm thickness. The study area was the brain, orbit and paranasal sinuses with a protocol of 130KVP and 120 to 180 MA tube current. Contrast MRI was done in a 1.5T Siemens Avento MRI machine with standard protocols of T1, T2, and post-contrast FATSAT T1 sequences in axial, coronal and sagittal planes.

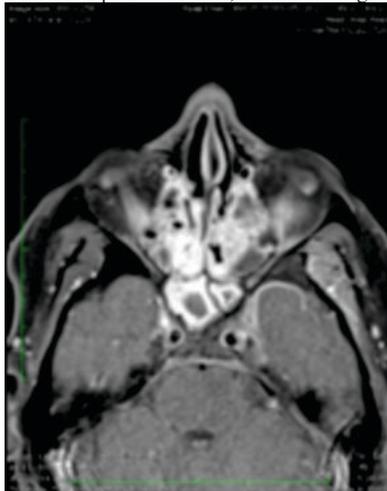


Figure.1: Mucosal Thickening And Collection Noted In The Ethmoidal And Sphenoid Sinuses With Non-enhancing Collection Within The Sphenoid And Left Ethmoidal Sinuses.

The study of the case series contains 46 patients diagnosed with mucormycosis. The patients underwent CT scan and contrast MRI scans. The age of the patients were range from 22 to 73 years with mean age of 49.4 years. Out of 46 patients 40 were males and 6 were females. The most common sinuses involved maxillary sinuses in 44 patients (95%). Followed by ethmoid sinuses in 42 patients (91%), sphenoid sinuses in 34 patients (73%) and least was in frontal sinuses in 31 patients (67%). Decreased vascularity and T2 Hypointensity of the turbinates – “black turbinate sign” were noted in 31 patients (67%). The infection was seen to involve pterygomaxillary fissure 39 patients (84%). Bony erosion was seen in 34 patients which accounts to 71% of the cases. The right orbit was commonly involved, was noted in 19 patients which accounted to 31%. And left eye in 11 patients (23%). Intracranial involvement was seen in 10 cases (21%) in the form meningeal enhancement, extradural collection and meningoencephalitis along with one case presented with abscess in the temporal lobe. T1 Hypointensity within the sinus was the common finding seen in 21 cases (61%).

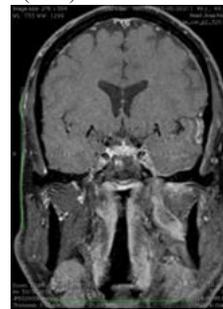


Figure.2: Enhancing Soft Tissue Component Noted In The Left Pterygomaxillary Region With Involvement Of Left Pterygoid Muscles.



Figure.3: Mucosal Thickening In Bilateral Maxillary And Ethmoidal Sinuses Suggestive Of Sinusitis With Few Areas Of T1 Hyperintensities Within The Sinuses

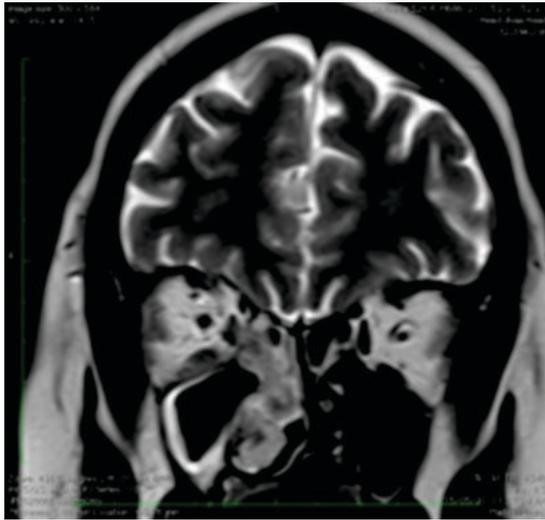


Figure.4: Mucosal Thickening In Right Ethmoidal And Maxillary Sinuses S/o Sinusitis With Heterogenous Single Intensities, Bony Erosion Of Right Laminae Papyracea Extending In To Right Orbital Cavity



Figure.5: "black turbinate sign"----hypo intensities of the right inferior turbinate with loss of normal architecture. Hypointense lesion/collection noted in the right lower ethmoidal sinus and nasal cavity along with mucosal thickening of the right maxillary sinus

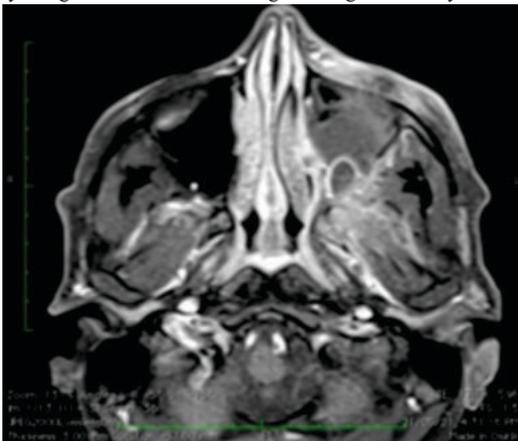


Figure.6: non enhancing collection noted in the left maxillary sinus causing bony destruction of the anterior and postero lateral wall extending in to infra temporal fossa with involvement of the pterygomaxillary fissure.

DISCUSSION:

Rhino cerebral mucormycosis is a highly invasive fungal infection

described in 1885 by Paulltauf A³. The described fungal infection can be seen in different body organs, however most commonly described in the head and neck region in the form of rhino cerebral form. The root of spread is by inhalation of spores of the fungi belong to genera of mucor. These fungal spores are seen in the damp environment of soil, air and dust. Due to defective defensive mechanism in the immune compromised patients especially in diabetes mellitus, post organ transplantation, patients with chronic corticosteroid, immune suppression, fungal infection is more prevalent and causes extensive spread in a short span of time^{1,2}.

Sinonasal spread of disease is most common form, gradually extends in to pterygopalatine fossa, later extends in to orbital cavity, predominantly in the medial orbital wall extends to brain parenchyma and also results in thrombosis of the adjacent intracranial vessels. Imaging helps in detection of extent of the disease, meningeal enhancement, thrombosis of major vessels which are important for the surgical planning^{3,4,5}.

MRI helps in detection of early stage of the disease with enhancing and non enhancing mucosa of the sinuses. Later with involvement of the vessels of the turbinates resulting in non enhancing turbinates described as black turbinate sign. Many patients showed isohyperintense signal intensities in T1W and T2W images due to presence of manganese and iron in the fungal elements^{4,6,7}. These cases showed extensive soft tissue edema with fat strandings of the face. Extension in to the orbit showed enhancing orbital contents, inflammatory collection fat strandings and few cases showed optic neuritis. Skull base involvement was noted with bony destruction⁸.

Periantral soft tissue infiltration in appropriate clinical setting should indicate the possibility of invasive fungal sinusitis^{9,10}. A brain abscess and meningitis can be fatal, They vary in clinical presentation and symptoms. Use of appropriate imaging modalities in early phase of the disease are essential to avoid protracted outcome of the disease^{11,12}.

CONCLUSION:

Rhinocerebral mucormycosis is a fatal fungal infection seen predominantly in immune-compromised patients. Acute invasive fungal sinusitis is highly fatal, needs early diagnosis to prevent complications. CT and MRI with contrast were helpful in early diagnosis. knowing the different patterns of involvement, and the extent of involvement of the disease with prompt diagnosis is helpful for the management of the disease.

REFERENCES:

1. G. Petrikkos, A. Skiada, O. Lortholary, E. Roilides, T.J. Walsh, D.P. Kontoyiannis Epidemiology and clinical manifestations of mucormycosis. Clin Infect Dis, 54 (2012), pp. S23-34.
2. S.S. Reddy, N. Rakesh, P. Chauhan, S. Sharma Rhinocerebral mucormycosis among diabetic patients: an emerging trend Mycopathologia, 180 (2015), pp. 389-396.
3. A. Diego, A.B.D. Herrera Imaging findings of rhinocerebral mucormycosis Skull Base Off J North Am Skull Base Soc Al, 19 (2009), pp. 117-125.
4. M. Mossa-Basha, A.T. Ilica, F. Maluf, Ö. Karakoç, I. Izbudak, N. Aygün The many faces of fungal disease of the paranasal sinuses: CT and MRI findings Diagn Interv Radiol Ank Turk, 19 (2013), pp. 195-200.
5. M.R. Terk, D.J. Underwood, C.S. Zee, P.M. Colletti MR imaging in rhinocerebral and intracranial mucormycosis with CT and pathologic correlation. Magn Reson Imaging, 10 (1992), pp. 81-87.
6. Jacob Therakathu, Shailesh Prabhu, Aparna Irodi, Sniya Valsa Sudhakar, Vikas K. Yadav, V. Rupa, Imaging features of rhinocerebral mucormycosis: A study of 43 patients, The Egyptian Journal of Radiology and Nuclear Medicine, Volume 49, Issue 2, 2018, Pages 447-452.
7. S. Safder, J.S. Carpenter, T.D. Roberts, N. Bailey The, "Black Turbinate" sign: An early MR imaging finding of nasal mucormycosis. AJNR Am Neuroradiol, 31 (2010), pp. 771-774.
8. E.H. Middlebrooks, C.J. Frost, R.O.D. Jesus, T.C. Massini, I.M. Schmalfluss, A.A. Mancuso. Acute invasive fungal rhinosinusitis: a comprehensive update of CT findings and design of an effective diagnostic imaging model Am J Neuroradiol, 36 (2015), pp. 1529-1535.
9. C.S. Silverman, A.A. Mancuso. Periantral soft-tissue infiltration and its relevance to the early detection of invasive fungal sinusitis: CT and MR findings. Am J Neuroradiol, 19 (1998), pp. 321-325.
10. Tamanna Khullar, Jyoti Kumar, Deeksha Sindhu, Anju Garg, Ravi Meher, CT Imaging Features in Acute Invasive Fungal Rhinosinusitis- Recalling the Oblivion in the COVID Era, Current Problems in Diagnostic Radiology, Volume 51, Issue 5, 2022, Pages 798-805.
11. V Epstein, R. Kern. Invasive fungal sinusitis and complications of rhinosinusitis Otolaryngol Clin North Am, 41 (2008), pp. 497-524.
12. M Aribandi, V McCoy, C. Bazan Imaging features of invasive and noninvasive fungal sinusitis: a review. RadioGraphics, 27 (2007), pp. 1283-1296.