



ORIGINAL RESEARCH PAPER

Radiodiagnosis

UTILITY OF MRI IN SINONASAL MUCORMYCOSIS AND COMPLICATIONS IN POST COVID PATIENTS.

KEY WORDS:

Dr. S. Balaji

Associate Professor, Department of Radiodiagnosis, Kilpauk Medical College, Chennai -10.

Dr. M. Ramesh*

Associate Professor, Department of Radiodiagnosis, Tamil Nadu Govt Multispeciality Hospital, Chennai. *Corresponding Author

ABSTRACT

The aim of this study was to determine the utility of MRI in suspected mucormycosis of sinonasal tract in post Covid 19 infected patients and the role of MRI in aiding the diagnosis and complications.

Materials and methods: 10 patients recovered after Covid 19 infection with suspected mucormycosis infection of the sinonasal tract underwent MRI to study the presence of sinonasal infection and complications like extrasinonasal spread, intraorbital and intracranial extension. Contrast was administered in selected patients and the study was correlated with CT scans and microbiological findings.

Results: MRI was done in suspected cases of mucormycosis. Paranasal involvement was found in all patients. Seven patients had extrasinus complications. Eight out of the ten patients had microbiological evidence of Mucormycosis. MRI was found to be useful in diagnosis and accurate detection of extrasinus spread with high sensitivity and specificity which is indispensable for management.

INTRODUCTION.

Sinonasal mucormycosis is a life-threatening infection with the causative organism being the genera Mucor, Rhizopus and Absidia. The disease is seen mostly in immunocompromised patients due to impaired phagocytic activity. There is recently an increased incidence of the disease in post Covid 19 patients in the prevailing pandemic. The clinical presentation in the early stages is usually fever, headache, facial pain, nasal discharge, nasal obstruction with ophthalmic symptoms in some cases. Progression is rapid leading to cranial nerve palsies and features of CNS involvement. Early imaging is helpful in diagnosis of the entity which helps in early and aggressive treatment. We performed this study in 10 patients with post covid status with clinical suspicion of sinonasal mucormycosis.

MATERIALS AND METHODS.

The study was done in the month of May 2021 in our institution. Ten patients who have recovered from Covid 19 infection and with clinical suspicion of sinonasal mucormycosis underwent MRI. All our patients were imaged in 1.5 Tesla MRI GE HDXT. The sequences used were T1, T2

weighted images, T2 weighted fat sat sequences in all planes, Axial diffusion weighted images of the paranasal sinuses and brain. MRA was performed in cases with cavernous sinus invasion. Two patients underwent additional contrast enhanced MRI.

RESULTS.

The findings involving the paranasal sinuses were evaluated for features of fungal sinusitis by two radiologists. Six patients had findings of pansinusitis (n=6). Four patients had involvement of either one or two sinuses (n = 4). Focal T2 hypointensity in the involved sinus was noted in 9 patients (Fig 1) (n = 9). Restricted Diffusion within the hypointense area was noted in two patients (n=2). Non enhancing turbinate (black turbinate sign) (Fig 2) indicative of necrosis was noted in the two patients who had contrast enhanced MRI (n=2). Seven out of ten patients had extraparanasal sinus involvement like intra orbital and intracranial extension (n=7). Eight out of the ten patients had microbiological evidence of Mucormycosis. The sensitivity and specificity of MRI in this study was found to be 100% and 98% respectively.

AGE AND SEX	PARANASAL INVOLVEMENT	EXTRA PARANASAL INVOLVEMENT	Microbiological evidence
38M	Pansinitis with focal T2 hypointensity in Left maxillary sinus	Multifocal acute non hemorrhagic infarcts in bilateral cerebral and cerebellar parenchyma. Soft tissue heterointense lesions in left premaxillary space, left masticator space inflammation in the left retroantral space, left infratemporal and splenopalatine foremen,	Positive
47M	Pansinusitis with focal T2 hypointensity in all the involved sinuses. Erosion of right middle and inferior turbinates.	Right preseptal soft tissue thickening. Soft tissue in the intraconal space of right orbit with thickening of orbital muscles.	Positive.
74 M	Pansinusitis with focal T2 hypointensity and soft tissue extending into the right nasal cavity	Mild left proptosis, right preseptal soft tissue thickening. Left optic nerve appears thickened with restricted Diffusion	Positive
68 M	Pansinusitis with focal T2 hypointensity and restricted Diffusion in left maxillary sinus showing non enhancing soft tissue. Non enhancing left inferior and middle turbinate (black turbinate sign)	Thickened left optic nerve showing restricted diffusion. Left cavernous sinus thrombosis	Positive.
45 M	Pansinusitis with T 2 hypointense area in left superior orbital fissure	Left cavernous sinus thrombosis with occlusion of left ICA. Left posterior cortical watershed acute infarct.	Positive.
43F	Sphenoidal sinusitis with focal T2 non enhancing area showing restricted diffusion.	--	Positive.

57M	Bilateral maxillary sinusitis with T2 focal hypointensity in left maxillary sinus	Occlusion of M1 segment of left MCA with left gangliocapsular and left perisylvian region acute infarcts.	Negative .
37M	Mild mucosal thickening in bilateral ethmoidal sinuses	---	Negative.
29M	Right maxillary sinusitis with T2 hypointense area with invasion of right infraorbital wall .	---	Positive.
51 M	Pansinusitis with non enhancing area in the right maxillary , right ethmoidal and frontal sinus. Non enhancing right middle turbinate (black turbinate sign)	Erosion of the medial wall of right orbit with intraorbital extension and orbital apex involvement. Retro antral extension with pterygomaxillary fissure involvement. Inferior orbital wall erosion with Premaxillary soft tissue .	Positive.

DISCUSSION.

Mucormycosis is an invasive fungal infection and though it involves different body organs , the most common type is the rhinocerebral form[1]. In immunocompromised state and in patients with poorly controlled diabetes mellitus these organisms can become pathogenic. [1].

Imaging is important in assessing the extent of disease, identification of complications which may help in surgical planning[2]. Imaging modalities including MRI may show non specific findings in early disease. Therefore clinical suspicion and prompt referral for imaging especially in prevailing pandemic situation is important for early diagnosis. Studies have shown that the disease can cause orbital and intracranial extension (like cavernous sinus thrombosis and vascular occlusion) which can be detected on MRI (3,4,5).

The disease can involve the sinonasal cavity with extension into orbits, masticator space, face, pterygopalatine fossa, hard palate, maxillary alveolus, zygomatic process, skull base involving the clivus and pterygoid process and intracranial extension to involve the cavernous sinus , internal carotid artery and brain parenchyma (6) .

MRI findings includes iso to hypointense pattern on T1 images with variable appearance on T2 weighted images. T2 hypointensity is commonly noted due to the presence of fungal elements which concentrate iron and manganese(7). Post contrast images shows intense enhancement of the involved sinuses. Tissue necrosis due to the angioinvasive nature of mucormycosis causes either heterogeneous appearance or a completely hypointense area (involvement of the turbinate is called as the black turbinate sign).

Extension of the soft tissue into the extra sinus regions has to be seen especially the orbit and intracranial locations. Cavernous sinus involvement appears as T1/T2 hypointensity with loss of flow void). Bony erosion can occur either in the early or late phase.

Staging

Stage 1 Nose & paranasal sinuses alone.

Stage 2 Paranasal sinuses with immediate adjacent areas which are surgically resectable with minimal morbidity ex-orbit (extraconal), palate & oral cavity .

Stage 3 Intracranial extension (extradural/intracerebral) or partially resectable with extension to pterygopalatinefossa, cavernous sinus, cheek and periorbital region.

CONCLUSION.

Magnetic resonance imaging is an excellent tool to diagnose mucormycosis infection of the sinonasal tract and its complications , with MRI being the best option which can diagnose the pathology at its early stage, therefore preventing complications. Extranasal spread is also accurately detected with MRI with high sensitivity which is helpful in early management of the disease.

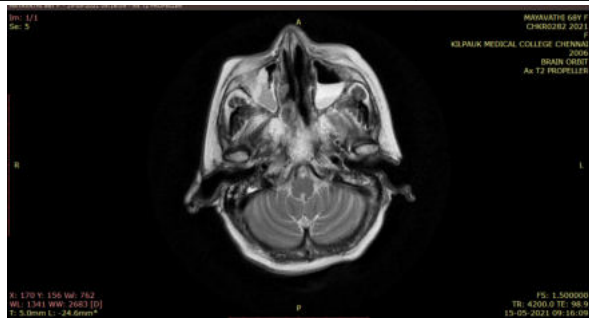


Fig 1 Axial T2 weighted images show hyperintense bilateral maxillary sinus with hypointense area within right maxillary sinus.

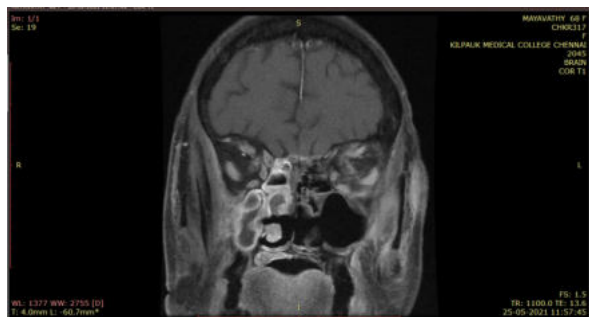


Fig 2 -Post contrast images showing non enhancing area within the right maxillary sinus and non enhancing right middle turbinate (Black turbinate sign)

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