MRI Predictors for Pterygopalatine and Infra-temporal Fossa Involvement in Mucormycosis

Mohsen Naraghi, MD, FARS[1,2], Hashem Sharifian, MD[3], Abuturab Jabbar Sayyed MD[4], Amirhossein Babaei, MD[4], Hamed Sarikhani, MD[5]

ABSTRACT

MRI has proven invaluable in assessing the extent of disease involvement and guiding prompt therapeutic interventions. Notably, the visualization of the pterygopalatine fossa (PPF) and infra-temporal fossa (ITF) has gained significant attention as these anatomical regions are frequently involved in ROCM.
This article encompasses a comprehensive analysis of predictors and their significance in determining the involvement of the PPF and ITF in ROCM.

Affiliations

1-Department of Otorhinolaryngology-Head and Neck Surgery, TUMS School of Medicine, Tehran
2-Orphans Worldwide, Jacksonville
3-Department of Radiology, TUMS School of Medicine
4-Rhinology Research Society, Tehran
5-Department of Emergency Medicine, Montefiore Medical Center, Albert Einstein College of Medicine, New York

INTRODUCTION

Rhino-orbital cerebral mucormycosis (ROCM) is a life-threatening fungal infection characterized by rapid invasion and destruction of the sinus and adjacent structures. Magnetic resonance imaging (MRI) has proven invaluable in assessing the extent of disease involvement and guiding prompt therapeutic interventions. Notably, the visualization of the pterygopalatine fossa (PPF) and infra-temporal fossa (ITF) has gained significant attention as these anatomical regions are frequently involved in ROCM. This article explores the various predictors that aid in identifying PPF and ITF involvement in sinus MRIs of patients with ROCM in the COVID-19 era.

METHODS AND MATERIALS

This cross-sectional study was conducted from October 2020 to October 2021 at a TUMS tertiary referral hospital, on all patients with confirmed ROCM. The inclusion criteria were patients over 18 years old with pathology confirming ROCM infection. Exclusion criteria were (1) patients with mucormycosis infection outside of the rhino-cerebral region and (2) patients with previous sinus surgery. For obtaining MR images, a GE 1.5 T MRI scanner was used which detected soft tissue involvement and orbital and brain extension.

MRI was reviewed regarding ethmoid, maxillary, frontal, and sphenoid sinus involvement, infra-temporal involvement, alveolar ridge involvement, intracranial abscess, involvement of dura, sinus cavernosa involvement, internal carotid artery (ICA) obstruction, pterygopalatine fossa (PPF) involvement, inferior orbital fissure (IOF) involvement, extra- and intra-conal involvement, and apex involvement.

RESULTS

Of 50 included patients, 29 (58.0%) were male and 21 (42.0%) females, with an average age of 56.32±12.30 years. The most common radiologic finding was involvement of the ethmoid sinus (98.0%), followed by the maxillary sinus (96.0%) and the frontal sinus (94.0%). The least common radiologic presentation was intracranial abscess (10.0%) and internal carotid artery (ICA) obstruction (12.0%). The results of statistical analysis revealed that ITF involvement was associated with a higher rate of dura (p=0.008), PPF (p=0.016), and alveolar ridge involvement (p=0.008). The results of statistical analysis showed that PPF involvement was associated with a higher rate of ITF (p=0. 016), inferior orbital fissure (p<0.001), extra-conal (p=0.035), intra-conal (p=0.020), and orbital apex (p=0.021) involvement.

Variable	Infra-temporal involvement				p-value
	Yes		No		
	Count	%	Count	%	
Frontal sinus involvement	29	93.5%	18	94.7%	1.000
Ethmoidal sinus involvement	30	96.8%	19	100.0%	1.000
Maxillary sinus involvement	29	93.5%	19	100.0%	0.519
Sphenoidal sinus involvement	28	90.3%	18	94.7%	1.000
Alveolar ridge involvement	19	61.3%	4	21.1%	0.008
Intracranial abscess	5	16.1%	0	0.0%	0.142
Involvement of dura	13	41.9%	1	5.3%	0.008
Sinus cavernosa involvement	7	22.6%	2	10.5%	0.452
Internal carotid artery obstruction	5	16.1%	1	5.3%	0.387
Pterygopalatine fossa involvement	23	74.2%	7	36.8%	0.016
Inferior orbital fissure involvement	20	64.5%	7	36.8%	0.081
Extra- conal involvement	22	71.0%	10	52.6%	0.233
Intra- conal involvement	18	58.1%	8	42.1%	0.383
Orbital apex involvement	17	54.8%	6	31.6%	0.148

Infra-temporal involvement and its related MRI findings

Variable	Pterygopalatine fossa involvement				p-value
	Yes		No		
	Count	%	Count	%	
Frontal sinus involvement	29	96.7%	18	90.0%	0.556
Ethmoidal sinus involvement	30	100.0%	19	95.0%	0.400
Maxillary sinus involvement	29	96.7%	19	95.0%	1.000
Sphenoidal sinus involvement	28	93.3%	18	90.0%	1.000
Infra temporal involvement	23	76.7%	8	40.0%	0.016
Alveolar ridge involvement	15	50.0%	8	40.0%	0.569
Intracranial abscess	4	13.3%	1	5.0%	0.636
Involvement of dura	11	36.7%	3	15.0%	0.118
Sinus cavernosa involvement	8	26.7%	1	5.0%	0.067
Internal carotid artery obstruction	6	20.0%	0	0.0%	0.069
Inferior orbital fissure involvement	26	86.7%	1	5.0%	<0.001
Extra- conal involvement	23	76.7%	9	45.0%	0.035
Intra- conal involvement	20	66.7%	6	30.0%	0.020
Orbital apex involvement	18	60.0%	5	25.0%	0.021

PPF involvement and its related MRI findings

CONCLUSIONS

In conclusion, this article encompasses a comprehensive analysis of predictors and their significance in determining the involvement of the PPF and ITF in ROCM. The findings of this study will aid healthcare professionals in better understanding the disease, enabling them to develop improved diagnostic and therapeutic strategies to combat this life-threatening condition. By harnessing the power of MRI, physicians can ensure timely and targeted interventions, improving patient outcomes in the face of this challenging disease

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