Journal of Biomedical Sciences | ISSN: 2960-9356
Research Article Peer-review, Open Access

Clinical Features, Risk Factors and Mortality of Rhino-Orbito-Cerebral Mucormycosis and its Relation to Covid-19

Sara Dhiaa Jawad [1], Naser Edan Naser [2], Muhanned Moussa Alwan [3]

Abstract

Background: Rhinocerebral mucormycosis is a uncommon opportunistic fungal infection of the sinuses, nasal passages, orbit, oral cavity, and brain. commonly affects individuals with diabetes and those in immunocompromised state.

Aim of study: To study the clinical features, risk factor, and outcome of Rhino-orbito-cerebral mucormycosis and their relationship to covid-19 infection.

Patients and methods: This retrospective study was done at Al-Imamain Al-Kadhimyain teaching medical city during the period from January 2021 to December 2021. Data collections were obtained from case file. All patients were diagnosed clinicaly and endoscopically with histopathological confirmation.

Result: The mean age of patients is 55.8 years with slightly increased incidence in female. Diabetes mellitus was the most common disease associated disease in 77 % of cases followed by chronic kidney disease in 22 % followed by hematological malignancy in 20%. Patients had a history of confirmed covid-19 infection in 86 %. Patients had facial and ocular pain in 100%, nasal obstruction in 90%, fever in 81 ,77% had periorbital odema. Orbital invasion seen in 45 %, intracrainal invasion seen in 27 % of patients. Mortality rate was 27 %.

Conclusion: Rhino-orbito-cerebral mucormycosis is an invasive, and often fatal commonly affects those with underlying diabetes mellitus, immunosuppression patients and COVID-19 patients. Diagnosis relies on nasendoscopy, CT imaging and histopathological analysis.

Keywords: Coronavirus-19, Rhinocerebral mucormycosis.

[1] M.B.CH.B, Iraqi board of ENT, Al-Imamain Al-Kadhimyain- Teaching Medical City, department of ENT, Baghdad, Iraq

[2]Consultant Otolaryngologist, Acting chairman of the Scientific Council of Otolaryngology

[3]Consultant otorhinolaryngologist, ENT department, Al-Imamain Al-Kadhimyain- Teaching Medical City/Baghdad Al Karkh /Health Directorate/Ministry of Health, Baghdad, Iraq

World of Medicine: Journal of Biomedical Sciences Vol .2 No.5 (2025)
https://wom.semanticjournals.org/index.php/biomed

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an acute viral illness caused by severe acute respiratory syndrome coronavirus-2 is a single stranded RNA beta coronavirus. (1)

Covid-19 is highly contagious with incubation around 1 to 14 days, the disease is a self-limiting most of the time with recovery in 1–2 weeks in most mildly symptomatic. (2) Rhinocerebral mucormycosis is a uncommon opportunistic fungal infection of the sinuses, nasal passages that can extend to oral cavity, and brain. The infection can rapidly result in death. It commonly affects individuals with diabetes and those in immuno-compromised state. (3)

It is almost exclusively seen in patients having immunocompromised status due to diabetes, steroid, malignancy, chemotherapy, or immunosuppressive drugs. (4)

Headache, nausea, fever, lethargy, facial pain, numbness, nasal obstruction, nasal discharge, anosmia, periorbital or retro-orbital pain, double vision, blurred vision, vision loss, gray or erythematous appearance of crustation can progress to black necrotic masses (black eschar), orbital cellulitis, conjunctival chemosis, proptosis, periorbital edema and ophthalmoplegia. (5-8)

The diagnosis depends on the direct and histological examination of scraping and biopsy of the necrotic material. (9) Radiological Findings: Computed tomography (CT): scanning demonstrates mucosal thickening and opacification of sinuses, destruction of the bone and orbit. (10) Magnetic resonance imaging shows findings similar to those on a CT scan. Magnetic resonance imaging also helps to define early orbital and intracranial invasion and infection along peripheral nerves. (11)

Management: treatment of rhinocerebral mucormycosis :1-Reversing underlying immunocompromised state.

2-Administering systemic antifungals. (12,13). Available formulations of Amphotericin B are: Liposomal Amphotericin-B-, conventional amphotericin-B, amphotericin-B lipid complex. (14)

Aim of study: To study the the clinical features, risk factor, and outcome of Rhino-orbito-cerebral mucormycosis and its relationship to Covid-19 infection.

Material and methods

This a retrospective observasional case series study was done at Al-Imamain Al-Kadhimyain teaching Medical city during the period between 1st January 2021 to 1st December 2021, include 22 patients who had confirmed Rhinoorbitocerebral mucormycosis by histopathological examination, some of them were admitted in medical department and other admitted in hematological department.

Inclusion criteria: adult age group diagnosed clinicaly to have Rhinocerebral mucormycosisand confirm by histopathological examination. Exclusion Criteria: Incomplete data.

Results

The results in table 1 demonstrate that there is an association of increased mortality with advanced aged group (more than 60 years old) p=0.029, in which 4/7 (57.14%) who died compared with 2/15 (13.33%) less than 60 years old. None significant association of mortality with gender (p=0.484), duration COVID-19 infection at beginning of mucormycosis (p=0.632). However, higher mortality rate was found in patients with multiple site involvement of mucormycosis 5/10 (50%) compared with only one patient 8.33% with single site involvement (p=0.029). Mortality is not related to side of involvement (p=0.591)

Table 1: Association of Demographic and some clinical parameters with outcome.

Characteristic		Outcome		p value
		Lived	Dead	
Age groups	< 60 years	13	2	0.029*
	%	86.67%	13.33%	
	> 60 years	3	4	
	%	42.86%	57.14%	
Sex	Male	8	2	0.484^{NS}
	%	80.00%	20.00%	
	Female	8	4	
	%	66.67%	33.33%	
Duration	1-3 weeks	8	3	0.632 ^{NS}
	%	72.73%	27.27%	
	4-6 weeks	6	3	
	%	66.67%	33.33%	
	> 6 weeks	2	0	
	%	100.00%	0.00%	
Site	Single	11	1	0.029*
	%	91.67%	8.33%	
	Multi	5	5	
	%	50.00%	50.00%	
Side	Right	11	3	0.591 ^{NS}
	%	73.33%	26.67%	
	Left	5	2	
	%	62.50%	37.50%	

NS: none significant (p>0.05), *: significant (≤0.05).

Association of mortality with co-morbidity and debridement: The results in table 2 demonstrate that there is an association of increased mortality with longer diabetes mellitus disease duration (p=0.005), however, mortality is not related with incidence of diabetes mellitus (p=0.119), chronic kidney disease (p=0.468), strong association of mortality was recorded in patients with hematological malignancies (p=0.001). Aggressive surgical debridement was associated with higher rate of mortality (p=0.017)

Table2: Association of comorbidity and surgical debridement with outcome.

Characteristics		Outcome		p value
		Lived	Dead	
Duration of DM	newly diagnosed	2	0	0.005*
	%	100.00%	0.00%	
	5-10 years	9	1	
	%	90.00%	10.00%	
	10-15 years	0	4	
	%	0.00%	100.00%	
	> 15 years	0	1	
	%	0.00%	100.00%	
Comorbidity	Diabetes mellitus	11	6	0.119 ^{NS}
	%	64.71%	35.29%	
	none	5	0	
	%	100.00%	0.00%	
	Chronic kidney disease	3	2	0.4673 ^{NS}

	%	60.00%	40.00%	
	none	13	4	
	%	76.47%	23.53%	
	Hematological malignancy	0	4	0.001**
	%	0.00%	100.00%	
	none	16	2	
	%	88.89%	11.11%	
	Hypertension	9	1	0.097 NS
	%	90.00%	10.00%	
	none	7	5	
	%	58.33%	41.67%	
Surgical debridement	None	15	3	0.017*
	%	83.33%	16.67%	
	aggressive	1	3	
	%	25.00%	75.00%	

NS: none significant (p>0.05), *: significant (≤0.05), high significant (p≤0.001)

Discussion

In the current study the most affected age group was 51-60 years old with mean age 55.8 years, this agrees with **Manesh** et al., and Chavan et al., who found similar findings most affected age group 51-60 years old. (15-16) These results disagree with: Elzein et al. The mean age of the patients was 43.45 years (17). In the current retrospective study, the majority were diabetic seen in 77.27% of patients with mucormycosis. 9.09% of mucormycosis patients were newly diagnosed with diabetes mellitus studies reviewed by the association of mucoromycosis and diabetes. (18). These results agree with: Indian study by Sen et al, found that 6 diabetic patients (100%) with concurrent mucormycosis and COVID-19 infection with 5(83%) of those patients had uncontrolled diapetes mellitus. (19)

The most common site involved in current study was the nasal cavity (100 % of cases) including middle turbinate (72 % of cases) and followed by inferior turbinates and nasal septum which were seen to be involved (50 % and 45% of cases respectively). hard palate involved in 13.6 %. The right side was more commonly involved (68.18 % of cases) with only 36.36 of cases with left side involvement. In Edward Balai et al, turbinates and septum were involved in 100 % of cases, hard palate was involved in 67 % of cases. (20)

Conclusion: Rhinocerebral mucormycosis is an acute, invasive and often fatal fungal diease. Commonest underlying Disease associated with Rhinocerebral mucormycosis is diabetes mellitus in 77%**.** COVID-19 patients had highest rate of developing Rhinocerebral mucormycosis. Commonest clinical presentation are orbital symptoms. Hight mortality rate occure with intracranial extension

Reference

1. Pingali C, Meghani M, Razzaghi H, Lamias MJ, Weintraub E, Tat'Yana AK, et al. COVID-19 vaccination coverage among insured persons aged≥ 16 years, by race/ethnicity and other selected characteristics—eight integrated health care organizations, United States, December 14, 2020–May 15, 2021. Morb Mortal Wkly Rep. 2021;70(28):985.
2. Azkur AK, Akdis M, Azkur D, Sokolowska M, van de Veen W, Brüggen M, et al. Immune response to SARS-CoV-2 and mechanisms of immunopathological changes in COVID-19. Allergy. 2020;75(7):1564–81.
3. Petrikkos G, Skiada A, Lortholary O, Roilides E, Walsh TJ, Kontoyiannis DP. Epidemiology and clinical manifestations of mucormycosis. Clin Infect Dis. 2012;54(suppl_1):S23–34.
4. Prakash H, Chakrabarti A. Global epidemiology of mucormycosis. J Fungi. 2019;5(1):26.

5. Scheckenbach K, Cornely O, Hoffmann TK, Engers R, Bier H, Chaker A, et al. Emerging therapeutic options in fulminant invasive rhinocerebral mucormycosis. Auris Nasus Larynx. 2010;37(3):322–8.
6. EleftheVairaktariserios, Moschos MM, Vassiliou S, Baltatzis S, Kalimeras E, Avgoustidis D, et al. Orbital cellulitis, orbital subperiosteal and intraorbital abscess. Report of three cases and review of the literature. J Cranio-maxillofacial Surg. 2009;37(3):132–6.
7. Turunc T, Demiroglu YZ, Aliskan H, Colakoglu S, Arslan H. Eleven cases of mucormycosis with atypical clinical manifestations in diabetic patients. diabetes Res Clin Pract. 2008;82(2):203–8.
8. Bhansali A, Sharma A, Kashyap A, Gupta A, Dash RJ. Mucor endophthalmitis. Acta Ophthalmol Scand. 2001;79(1):88–90.
9. Gupta N, Honavar SG. Rhino-Orbito- Cerebral Mucormycosis.
10. Reddy CEE, Gupta AK, Singh P, Mann SBS. Imaging of granulomatous and chronic invasive fungal sinusitis: comparison with allergic fungal sinusitis. Otolaryngol Neck Surg. 2010;143(2):294–300.
11. Lone PA, Wani NA, Jehangir M. Rhino-orbito-cerebral mucormycosis: magnetic resonance imaging. Indian J Otol. 2015;21(3):215.
12. Gillespie MB, O'Malley BW. An algorithmic approach to the diagnosis and management of invasive fungal rhinosinusitis in the immunocompromised patient. Otolaryngol Clin North Am. 2000;33(2):323–34.
13. Luna B, Drew RH, Perfect JR. Agents for treatment of invasive fungal infections. Otolaryngol Clin North Am. 2000;33(2):277–99.
14. Aranjani JM, Manuel A, Abdul Razack HI, Mathew ST. COVID-19–associated mucormycosis: Evidence-based critical review of an emerging infection burden during the pandemic's second wave in India. PLoS Negl Trop Dis. 2021;15(11):e0009921.
15. Manesh A, Rupali P, Sullivan MO, Mohanraj P, Rupa V, George B, et al. Mucormycosis—A clinicoepidemiological review of cases over 10 years. Mycoses. 2019;62(4):391–8.
16. Chavan RP, Ingole SM, Nazir HA, Desai W V, Kanchewad GS. Mucormycosis in COVID-19 pandemic: study at tertiary hospital in India. Eur Arch Oto-Rhino-Laryngology. 2022;279(6):3201–10.
17. Elzein F, Albarrag A, Kalam K, Arafah M, Al-Baadani A, Eltayeb N, et al. Mucormycosis: an 8-year experience of a tertiary care centre in Saudi Arabia. J Infect Public Health. 2020;13(11):1774–9.
18. Motamedi M, Golmohammadi Z, Yazdanpanah S, Saneian SM, Shafiekhani M. Epidemiology, clinical features, therapeutic interventions and outcomes of mucormycosis in Shiraz: an 8-year retrospective case study with comparison between children and adults. Sci Rep. 2022;12(1):1–10.
19. Sen M, Honavar SG, Bansal R, Sengupta S, Rao R, Kim U, et al. Epidemiology, clinical profile, management, and outcome of COVID-19-associated rhino-orbital-cerebral mucormycosis in 2826 patients in India–Collaborative OPAI-IJO Study on Mucormycosis in COVID-19 (COSMIC), Report 1. Indian J Ophthalmol. 2021;69(7):1670.
20. Balai E, Mummadi S, Jolly K, Darr A, Aldeerawi H. Rhinocerebral mucormycosis: a ten-year single centre case series. Cureus. 2020;12