ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 05 | May - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

AN OBSERVATIONAL ANALYSIS OF PROFILE AND OUTCOME OF POST COVID-19 MUCORMYCOSIS PATIENTS AT A TERTIARY CARE FACILITY, JAIPUR: A CROSS SECTIONAL STUDY

Otorhinolaryngology

Giriraj Prasad Trivedi	M.B.B.S., M.S. (ENT), Medical officer, ENT specialist, Ministry of health and family welfare, Jaipur, Rajasthan, India.
Shraddha Sharma	M.B.B.S., M.S. (ENT), Medical officer, ENT specialist, Ministry of health and family welfare, Jaipur, Rajasthan, India.
Somya Grover	M.B.B.S. Resident doctor, Department of Preventive and Social Medicine, SMS Medical College, Jaipur, Rajasthan, India.
Kailash Singh Jat	M.B.B.S., M.S. (ENT), Assistant Professor, Department of ENT, SMS Medical College, Jaipur, Rajasthan, India.
Ajay Gupta*	M.B.B.S. Resident doctor, Department of Preventive and Social Medicine, SMS Medical College, Jaipur, Rajasthan, India.*Corresponding Author

ABSTRACT

Background: Mucormycosis is a rare opportunistic aggressive and fatal infection caused by mucor fungus. Since, COVID-19 is an immunocompromised state, the advent of COVID -19 saw an uprising case of mucormycosis, known as Covid associated mucormycosis (CAM).
Aim: The aim of present study is to evaluate the profile, comorbidities and outcome of invasive fungal sinusitis patients.
Material and methods: This hospital based, observational, prospective study was conducted at Tertiary care hospital, Jaipur for the period of six months from July 2020 to December 2020. All patients of mucormycosis invasive to paranasal sinuses, presented to the ENT department, either as an out-patient or following departmental referral, who were either COVID-19 positive or had recovered from COVID-19 infection were included in the study. Demographic details including age and gender, clinical and laboratory data along with the comorbidities, treatment details, follow-up details, surgical intervention details of all 46 patients were collected and analysed using Microsoft office 2019.
Result: Around two thirds 65.2% (30/46) were male and rest 34.8% (16/46) were female. Mean age of patients was 42.4±11.8 years. Maximum 31(67.4%) cases had diabetes. Out of them, 24(52.2%) cases had HbA1C level more than 6.5. Most 34(73.9%) cases had taken steroid therapy in treatment of COVID-19. Two (4.3%) cases were COVID-19 positive at the time of admission while rest 44(95.7%) cases were previously infected with COVID-19 and were successfully treated for the same. Most common involved paranasal sinus was maxillary 39(84.8%), and least involved sinus was frontal sinus in 18(39.1%) cases.
Conclusion: COVID-19 is an immunocompromised state and due to increase chances of thrombus formation, it can be undoubtedly led to mucormycosis. Also, the use of steroids and diabetogenic state is associated with increase chances of CAM. If diagnosed at early stage, it can be managed with the use of less radical surgery and antifungal.

KEYWORDS

COVID-19, Invasive fungal sinusitis, Mucormycosis.

INTRODUCTION:

The novel corona virus disease 2019 (Covid-19) pandemic caused by severe acute respiratory syndrome Coronavirus-2 (SARS CoV-2 belonging to -Coronavirus), which started in December 2019 in the city of Wuhan, Hubei province in China, is a highly contagious zoonosis which has human to human spread by respiratory secretions (Covid-19). [1,2] Emergency of international concern.[3] On March 11, 2020 WHO announced the Covid-19 as pandemic.[4] Covid -19 initially included only a dry cough and high grade fever, to additionally include various multisystem problems such as shortness of breath, anosmia, ageusia, diarrhoea, generalised malaise, acute cardiac injury and secondary infections.

Otolaryngologic symptoms comprise a large percentage of the mild COVID-19 symptomatology with reports of smell and taste disturbance being the only manifestation in "asymptomatic" individuals [5]. There has been role of nasopharyngeal swab for diagnosis of Covid -19.

As Covid -19 impairs our immune system, it has led to variety of clinical pictures ranging from asymptomatic to clinically dreaded picture in form of invasive pulmonary mucormycosis to rhinocerebral mucormycosis.[6] Mucormycosis is a rare opportunistic aggressive and fatal infection caused by mucor fungus. Seven types of mucormycosis have been identified based on the pattern of involvement, with rhinocerebral form being the most common life-threatening opportunistic mycotic infection[7] caused by saprophytic fungi (phycomycetes, zygomycetes, mucoraceae) frequently found in soil, residue plants, spoiled food and upper respiratory tract of healthy people.[8] It becomes pathogenic when associated with predisposing factors such as immunocompromised states most commonly (60-81%) diabetes mellitus.[9,10]

Since, fungal hyphae have high affinity to bind the internal elastic lumina of arterial blood vessels, they are highly angioinvasive and cause thromboembolism thus subsequently leading to thrombotic infarction.[11] Involvement of cranial nerve findings signify severe infection and signal a grave prognosis. Mucormycosis is characterized by the presence of hyphal invasion of sinus tissue and a time course of less than four weeks [12]. The most common type, that is, rhinocerebral mucormycosis can present with atypical signs and symptoms similar to complicated sinusitis, such as nasal blockade, crusting, proptosis, facial pain and oedema, ptosis, chemosis, and even ophthalmoplegia, with headache and fever and various neurological signs and symptoms if intracranial extension is present[13].A black eschar is often seen in the nasal cavity or over the hard palate region, but is not characteristic[14]. Histological features include mycotic infiltration of blood vessels, vasculitis with thrombosis, tissue infarction, haemorrhage [15]. The recent increase in surge of mucormycosis could be seen clinically and in operation theatres due to radical surgery being undertaken so as to decrease the fungal load is due to increase in covid cases which has led to an immunocom promsied state, hypercoagulable state, diabetogenic state leading to thrombus formation, infarction, necrosis of the tissue, which provides a favorable environment for the fungal infection to grow. Also, the patients infected with covid infection show an overexpression of inflammatory cytokines, and impaired cell-mediated immunity with decreased cluster of differentiation 4 and 8 positive T-helper (CD4+ T and CD8+ T) cell counts, indicating susceptibility to fungal co-infections [16].

Extensive use of steroids, intensive care treatment, use of oxygen support, steam inhalation has also led to an increase in case of CAM, which is seen particularly in middle and late phase of the disease. The aim of present study is to evaluate the profile, comorbidities and outcome of invasive fungal sinusitis patients.

MATERIAL AND METHODS:

This hospital based, observational, prospective study was conducted in the Department of Otorhinolaryngology and Head Neck Surgery at S.M.S. Medical College and Attached Group of Hospitals, Jaipur for the period of six months from July 2020 to December 2020. All patients of mucormycosis invasive to paranasal sinuses, presented to the ENT department, either as an out-patient or following departmental referral, who were either COVID-19 positive or had recovered from COVID-19 infection were included in the study. Diagnosis of mucormycosis was done on the basis of recognition of risk factors, assessment of clinical manifestations, early use of imaging modalities and prompt initiation of diagnostic methods based on histopathology, cultures and advanced molecular techniques. Total 46 patients were admitted in the hospital during the study time period. Demographic details including age and gender, clinical and laboratory data along with the comorbidities, treatment details, follow-up details of all patients were collected. Details of any surgical intervention required and outcome (death/ discharge) were also collected. Data was entered into Microsoft excel spreadsheet and analysed using Microsoft office 2019.

RESULTS:

Total 46 patients were admitted in the treatment facility, out of them around two thirds 65.2% (30/46) were male and rest 34.8% (16/46) were female. Mean age of patients was 42.4±11.8 years. Maximum 31(67.4%) cases had history of diabetes. Out of them, 24(52.2%) cases had HbA1C level more than 6.5. Most 34(73.9%) cases had taken steroid therapy in treatment of COVID-19.

Out of all patients, around every one of three 34.8% (16/46) case had intraorbital extension and five (10.9%) cases had extension upto cranium. Orbital exenteration was required in two(4.3%) cases.

Two (4.3%) cases were COVID-19 positive at the time of admission while rest 44(95.7%) cases were previously infected with COVID-19 and were successfully treated for the same.

(Figure-1) Most common involved paranasal sinus was maxillary 39(84.8%), followed by Ethmoidal sinus involvement in 34(73.9%) cases, sphenoidal sinus in 22(47.8%) cases and least involved sinus was frontal sinus in 18(39.1%) cases.

DISCUSSION:

Various forms of mucormycosis have been recognized. Mucormycosis (mycosis mucorina) was first reported by Paultouf[17]. Cephalic mucormycosis has two forms of which rhinoorbitocerebral form is a fatal variety and rhino paranasal sinuses form generally follows a benign clinical course. During the SARS-CoV infection spread in 2003, the incidence of fungal infection was 14.8–27 percent, and it was the main cause of death for severe acute respiratory syndrome patients, accounting for 25–73.7 per cent in all causes of death [18-20]. Studies have shown that SARS-CoV and SARS-CoV-2 belong to the same species, and have similar prevalence rates and biological and clinical characteristics [21]. It causes diffuse alveolar damage with severe inflammatory exudation. Covid-19 patients always have immunosu ppression with a decrease in CD4+ T and CD8+ T cells [22].

White et al. studied 135 adults with Covid-19 infection, and reported an incidence of 26.7 percent for invasive fungal infections [23]. Song et al. studied the association between Covid-19 and invasive fungal sinusitis in April 2020, and concluded that a large number of patients affected by or recovered from Covid-19 are at increased risk of developing invasive fungal diseases, and gave a management algorithm for such cases [16]. In a recent review, 8 per cent of coronavirus-positive or recovered patients had secondary bacterial or fungal infections during hospital admission, with widespread use of broad-spectrum antibiotics and steroids [24]. Mucor has been found to be normally present in nasal mucosa as a commensal [25]. Due to decrease in immunity, it has propensity to bear the spores which have the ability to invade the nasal and paransal mucosa and cause devastating disease in the form of rhinomaxillary mucormycosis or, if invades orbit and brain, then rhino-orbital cerebral form. Non-contrast computed tomography of the paranasal sinuses is usually the first investigation of choice, with gadolinium-enhanced magnetic resonance imaging being resorted to if intra-orbital or intracranial extension is suspected. Focal bony erosions and extrasinus spread are strongly suggestive of the diagnosis [25]. Aggressive surgical debridement of the nasal, paranasal tissue so as to debulk the tissue and, thus fungal load remains the first choice of treatment. Amphotericin deoxycholate remains the antifungal of choice.

CONCLUSION:

It can be concluded that since COVID-19 is an immunocompromised state which suppresses our defensive T lymphocytes of our body, and due to increase chances of thrombus formation, further leading to ischemia and necrosis of the tissue, it can be undoubtedly led to mucormycosis if not controlled initially. Also, the use of steroids and diabetogenic state is associated with increase chances of CAM. If diagnosed at early stage, it can be managed with the use of less radical surgery and antifungal.

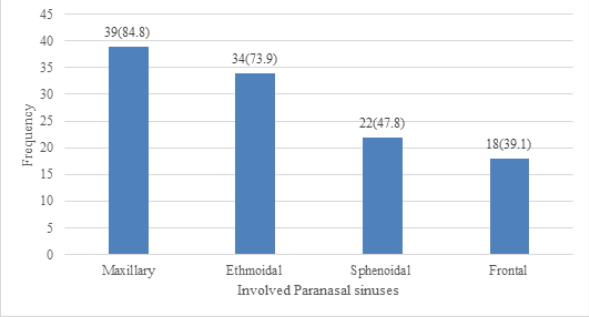

Figure 1- Distribution of involved paranasal sinuses in mucorm ycosis patients

REFERENCES:

1. Wuhan City Health Committee. Wuhan Municipal Health and Health Commission's briefing on the current pneumonia epidemic situation in our city 2019. In: http://wjw.wuhan.gov.cn/front/web/showDetail/2019123108989 [14 January 2020]
2. Mohan Bansal, Covid-19 : An Otorhinolaryngology Perspective, Orcid ID: https://orcid.org./0000-0002-4947-2389).
3. Alessandro Micarelli, Lvan Granito, Pasquale Carlino, Beatrice Micarelli and Marco Alessandrini- Self-perceived general and ear nose throat symptoms related to the Covid-19 outbreak: a survey study during quarantine in Italy, (https://creativecommons.org/licenses/bync/4.0/), (https://us.sagepub.com/en-us/nam/ open-access-at-sage),
4. Shashidhar S. Suligavi, Saif N. Saiyad", Sangappa S. Doddamani, Mallikarjun Patil, Archana Mathri, Divya K.V.- Management of ear, nose, and throat out patient department in Covid-19 pandemic, experience: a descriptive study, http://dx.doi.org/10.18203/issn.2454- 599-ijohns 20204620
5. Krajewska J, Krajewski W, Zub K, Zaton´ski T (2020) COVID-19 in otolaryngologist practice: a review of current knowledge. Eur Arch Oto-Rhino-Laryngol 277:1885–1897
6. Bhatt K, Agolli A, Patel MH, et al. High mortality co-infections of COVID-19 patients: mucormycosis and other fungal infections. Discoveries 2021;9:e126.
7. Santos Gorjón P, Blanco Pérez P, Batuecas Caletrío A, Muñoz Herrera AM, Sánchez González F, de la Fuente Cañibano R. Rhinoorbito-cerebral mucormycosis, a retrospective study of 7 cases. Acta Otorrinolaringol Esp 2010;61:48-53.
8. Koc Z, Koc F, Yerdelen D, Ozdogu H. Rhino-orbital-cerebral mucormycosis with diff erent cerebral involvements: Infarct, hemorrhage, and ophthalmoplegia. Int J Neurosci 2007;117:1677-90.
9. Bhansali A, Bhadada S, Sharma A, Suresh V, Gupta A, Singh P. Presentation and outcome of rhino-orbital-cerebral mucormycosis in patients with diabetes. Postgrad Med J 2004;80:670-4.
10. Cohen SG, Greenberg MS. Rhinomaxillary mucormycosis in a kidney transplant patient. Oral Surg Oral Med Oral Pathol 1980;50:33-8.
11. Davis RL, Robertson DM. Textbook of Neuropathology. 2nd ed. Baltimore: Williams & Wilkins; 1991. p. 761-3.
12. Ferguson BJ. Definitions of fungal rhinosinusitis. Otolaryngol Clin North Am 2000;33:227–35
13. 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;37:322–8
14. Mohindra S, Mohindra S, Gupta R, Bakshi J, Gupta SK. Rhinocerebral mucormycosis: the disease spectrum in 27 patients. Mycoses 2007;50:290–6
15. DeShazo RD, Chapin K, Swain RE. Fungal sinusitis. N Engl J Med 1997;337:254–9
16. Song G, Liang G, Liu W. Fungal co-infections associated with global COVID-19 pandemic: a clinical and diagnostic perspective from China. Mycopathologia 2020;185:599–606
17. Lamia A, Kilani B, Tiouiri H, *et al*. Mucormycose: Apropos de quatre observations. Tunis Med 2008;86:165-8.
18. Zhang Y, Li WX, Huang KW, Cao ZX, Hao JY. Hospital acquired pneumonia occurring after acute stage of the serious SARS and its treating strategies. Chin J Nosocomiol 2003;11:1081–7
19. Yin CH, Wang C, Tang Z, Zhang SW, Wang BS. Clinical analysis of 146 patients with critical severe acute respiratory syndrome in Beijing areas. Clin J Emerg Med 2004;1:12–14
20. Li CS, Pan SF. Analysis and causation discussion of 185 severe acute respiratory syndrome dead cases [in Chinese]. Zhongguo Wei Zhong Bing Ji Jiu Yi Xue 2003; 15: 582–4
21. Peeri NC, Shrestha N, Rahman MS, Zaki R, Tan Z, Bibi S et al. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? Int J Epidemiol 2020;49:717–26
22. Yang W, Cao Q, Qin L, Wang X, Cheng Z, Pan A et al. Clinical characteristics and imaging manifestations of the 2019 novel coronavirus disease (COVID-19): a multi-center study in Wenzhou city, Zhejiang, China. J Infect 2020;80:388–93
23. White L, Dhillon R, Cordey A, Hughes H, Faggian F, Soni S et al. A national strategy to diagnose coronavirus disease 2019 – associated invasive fungal disease in the intensive care unit. Clin Infect Dis 2020;ciaa1298
24. Rawson TM, Moore LS, Zhu N, Ranganathan N, Skolimowska K, Gilchrist M et al. Bacterial and fungal coinfection in individuals with coronavirus: a rapid review to support COVID-19 antimicrobial prescribing. Clin Infect Dis 2020;71:2459–68
25. Ballester DG, González-García R, García CM, Ruiz-Laza L, Gil FM. Mucormycosis of the head and neck: report of five cases with different presentations. J Craniomaxillofac Surg 2012;40:584–91