

Co-Infection of Mucormycosis and Actinomycosis in COVID-19 Infection

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is an infection caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). COVID-19 infection may be associated with a wide range of bacterial and fungal co-infections.

Herewith a case of 46 year-old male patient of post COVID-19 developed co-infection. He had received steroid treatment and improved in last month. He is known case of diabetes type II since last one year and was on treatment. Now presented to our hospital having fever, facial pain, and swelling mid-face region. His RT-PCR test was positive. The CT scan of the nasal septum, medial walls of bilateral maxillary, ethmoid, sphenoid and frontal sinuses extending into bilateral nasal cavities. Features suggestive of infective pathology invasive fungal rhinosinusitis. On clinical, radio imaging and on histopathological findings diagnosed as maxillary mucormycosis with actinomycosis.

Conclusion: We are presenting this rare case of COVID-19 associated with co-infection of mucormycosis and actinomycosis for its clinical, radio imaging, and on histopathological findings.

Key Words: Coronavirus Disease 2019 (COVID-19), Mucormycosis, Actinomycosis, Co-infections.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) has become a pandemic. Covid 19 is associated with a significant incidence of secondary infections, both bacterial and fungal. ^[1] Mucormycosis is an opportunistic fungal infection caused by fungi belonging to Mucormycetes (Mucor, Rhizopus, Lichtheimia, Cunninghamella). Mucormycosis are usually seen in the soil and water. Secondary infections are seen in Covid 19 infected patients, mostly in individuals with pre-existing immunosuppression. There are increased in the super infections which were rarely reported in the beginning of the current pandemic of COVID 19. There is

particularly reports about secondary fungal disease mucormycosis are on rise. ^[2] Only a few cases have been reported in the literature related to Covid 19 and mucormycosis associated with actinomycosis.

CASE REPORT

A 46 year old male patient, diagnosed as COVID-19 infection month back, also a known case of type 2 diabetes mellitus, presented with complaints of headache, bilateral nasal obstruction, swelling mid-face region, foul smelling nasal discharge and fever. The patient RT – PCR test was positive for Covid 19 one

month back. CT scan -PNS (plain + contrast) showed residual/recurrent ill-defined heterogeneously enhancing soft tissue thickening noted in the parts of nasal septum, medial walls of bilateral maxillary, ethmoid, sphenoid and frontal sinuses extending into bilateral nasal cavities. Features suggestive of infective pathology of invasive fungal rhinosinusitis. (Figure 1 A,B) There is evidence of bone defect in anterior wall of left maxillary sinus extending to the alveolar process of maxilla on left side. Few enlarged cervical lymph

nodes seen on both sides. Bilateral orbits including extraocular muscles and retro orbital fat appear normal. Cribriform plate and crista galli appear normal. Rest of the visualised bones appear normal. Visualised brain parenchyma appears normal.

Patient underwent right hemimaxillectomy with bilateral sinus curettage; debridement of the devitalized areas in the nasal floor was done. Necrotic maxillary and palatal bone with teeth 18-21 were removed.



Figure-1A,B: CT scan -PNS heterogeneously enhancing soft tissue thickening of nasal septum, walls of maxillary, ethmoid, sphenoid and frontal sinuses extending into bilateral nasal cavities.

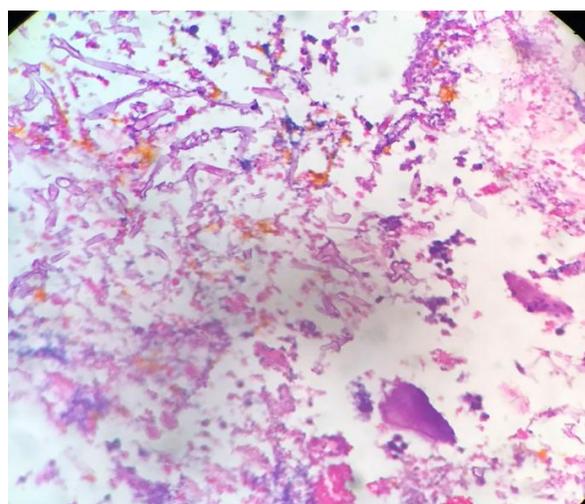


Figure-2: On microscopy areas of inflamed granulation tissue and necrosis showing colonies of mucormycosis consisting of broad, non-septate hyphae and actinomycosis. (H&E Stain.40x)

On microscopy revealed as tissue lined by columnar epithelium showing ulceration and underlying subepithelial

tissue showed extensive areas necrosis and inflammation predominantly of neutrophils along with scattered lymphocytes, plasma cells, macrophages and few giant cells. Areas of inflamed granulation tissue, hemorrhage and congestion was noted. Necrotic areas showed numerous colonies of mucormycosis consisting of broad, non-septate hyphae. (Figure -2, Figure 3) The PAS, Grocott's methenamine silver stain showed fungal hyphae of mucormycosis and actinomycosis. On histopathological examination the patient was diagnosed with mucormycosis and actinomycosis. The specific treatment guide followed for COVID-19 and co-infection. After treatment with Amphotericin-B -antifungal therapy showed improvement. Patient is advised regular follow up.

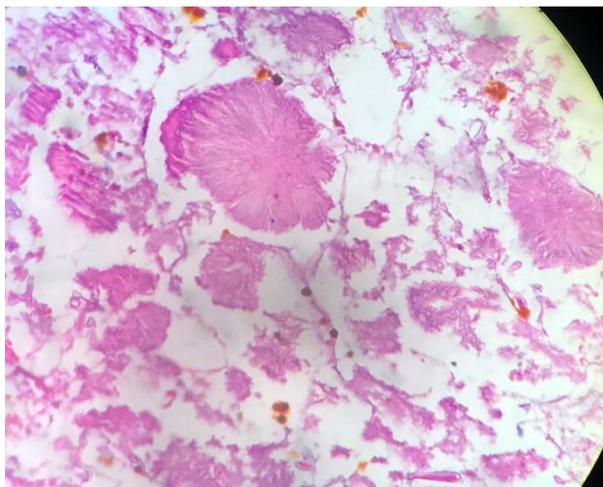


Figure-3: On microscopy high power view of mucormycosis consisting of broad, non-septate hyphae and actinomycosis. (H&E Stain.100x)

DISCUSSION

Co-infection of mucormycosis, actinomycosis and COVID-19 of these three pathogens in a same host is rare. The cases of mucormycosis have been reported in patients those recently recovered from COVID-19 in many regions of India. The COVID 19 pandemic has thrown up yet another challenge for the healthcare sector, with isolated cases of an unusual fungal infection being reported with also showing rise in mortality. In recent studies observed that, in COVID-19 infected patient who treated with widespread use of broad spectrum antibiotic or steroid and recovered developed secondary bacterial or fungal infection in 8%.^[3]

The critically ill-patients, patients on mechanical ventilation and those with longer hospital stay are more likely to develop fungal co-infection Mucormycosis are seen in the nature widely distributed. The primary sites of invasion are nasal sinuses which spread as rhino-maxillary and rhino-cerebral-orbital mucormycosis.^[4] The common clinical features are mild fever, headache, swelling, facial pain, also other sites for mucormycosis invasion are pulmonary, cutaneous, gastrointestinal tract or disseminated. They infect immunosuppressed individuals and the major predisposing factors are malignancies, organ transplants,

neutropenia, corticosteroid use, diabetes mellitus, HIV etc.^[5,6]

This fungus usually induces a pyogenic inflammatory reaction which is characterised by abscess formation. The hyphae are characteristically broad, usually aseptate, thin walled. The size range in width from 3 - 25 μ m and in length upto 200 μ m. They are empty, having focal bulbous dilatation or irregular branching mostly at right angles. They take its invasive form resulting in vascular invasion, thrombosis and necrosis.

Actinomycosis is commensal in the oral cavity. Actinomycosis is an infrequent invasive bacterial disease that has been recognized for over a century. *Actinomyces* spp. are, anaerobic, Gram-positive, filamentous bacteria. It causes chronic suppurative inflammation. Actinomycosis commonly involves cervicofacial, thoracic, abdomino-pelvic region and central nervous system.^[7,8]

Within the cervicofacial region actinomycosis has been reported in oral cavity, mandible, maxilla, paranasal sinuses, salivary glands, and eye, ear and neck areas. Invasion of *Actinomyces* is precipitated by factors such as dental caries, trauma, immunosuppression and periodontitis.

Beyond the pathogenesis of SARS-CoV-2, microbial coinfection plays an important role in the occurrence and development of increasing the disease symptom and mortality. Among COVID-19 patients the various co-pathogens included bacteria, such as *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Legionella pneumophila* and *Acinetobacter baumannii*; *Candida* species and *Aspergillus flavus*; and viruses such as influenza, rhinovirus/enterovirus, parainfluenza, metapneumovirus, influenza B virus, and human immunodeficiency virus were noted. 8 Combined orofacial aspergillosis and mucormycosis was reported by Chermetz M et al.^[9] Jagtap SV, et al reported case of mucormycosis in post COVID-19 infection

who received steroid treatment and also a case of HIV/AIDS.^[10] Lin et al reported a case of a cavitary pulmonary lesion with aspergillosis, mucormycosis, and actinomycosis co-infection.^[11] The specific treatment guide lines should be follow for COVID-19 and co-infection.^[12] The appropriate antimicrobial agents treatment is essential to reduce the mortality.

CONCLUSION

Among COVID-19 patients, recognizing the possible pathogens causing co-infection is important. We are presenting this rare case of COVID-19 associated with co-infection of mucormycosis and actinomycosis for its clinical, radio imaging, and on histopathological findings. The appropriate antimicrobial agents treatment is essential to reduce the mortality.

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