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TRINITY OF COVID-19, MUCORMYCOSIS AND ACTINOMYCOSIS- A CASE REPORT

Dr. Anjana A. Mohite	M.S ENT; DLO, Assoc Prof., Dept. of ENT,D.Y. Patil Medical College, Kolhapur.
Dr. Tanima Taslima	MBBS, JR Dept of ENT, Dept. of ENT, D.Y. Patil Medical College, Kolhapur.
Dr. Rajashri Mane*	M.S ENT, HOD Dept. of ENT, D.Y. Patil Medical College, Kolhapur. *Corresponding Author
Dr. Vasundhara P. Varute	M.S ENT, Assoc Prof Dept. of ENT, D.Y. Patil Medical College, Kolhapur.

ABSTRACT The unprecedented increase of COVID-19 associated mucormycosis during the second pandemic wave was a perfect tsunami in India! Of 81% of total cases of COVID associated mucormycosis worldwide were reported from India according to a review article published in 2021.In our understanding of the biological behaviour of this unholy combination we were surprised by the third contributor that is actinomycosis. We report a case with trinity COVID-19, mucormycosis and actinomycosis infection at our tertiary care centre. The organisms of actinomycosis are gram positive filamentous bacteria that are commensal flora in humans of oral cavity, GI tract and urinary tract. It causes chronic suppurative inflammation. It commonly involves cervico-facial, thoracic, abdomino-pelvic region and central nervous system. Actinomyces is precipitated by dental caries, trauma, immunosuppression and periodontitis. Actinomycosis is an internal infection which is caused by a lesion in the mucosa. The disease is characterised by an indurated mass that is painless and evolves into many abscesses with sinus that typically express yellow sulphur granules. Histopathology and culture are the gold standard for diagnosis of the disease. Along with surgical drainage of abscess and debridement of necrotic bony tissue, beta lactam antibiotics are the preferred treatment.[2] We present an intriguing example of a 50-year-old male patient who has experienced the trinity of COVID-19 infection, Mucormycosis and Actinomycosis.

KEYWORDS : COVID-19, Mucormycosis, Actinomycosis, Case report

INTRODUCTION

COVID-2019 was a pandemic that was associated with many secondary infections, both bacterial and fungal. Mucormycosis was one such opportunistic infection noticed during COVID times.

Mucormycosis an opportunistic infection caused by fungi belonging to Mucormycetes (Mucor, Rhizopus, Lichthemia, Cunninghamella) mostly affects immunocompromised individuals.

Actinomycosis is an internal infection which is caused by a lesion in the mucosa. The disease is characterised by an indurated mass that is painless and evolves into many abscesses with sinus that typically express yellow sulphur granules.[2]Histopathology and culture are the gold standard for diagnosis of the disease.

Case Report

We present a case of 50 years old male, non-diabetic who came to our OPD with complaints of multiple loose maxillary teeth on right side since 4 months. He was a victim of 2nd wave of Covid-19 who needed ICU stay with O2 support.

Figure: clinical pre-operative picture showing missing right maxillary teeth and few blackish discolouration, oro-antral fistula. Second picture shows fistula below lateral canthus of right eye.

4 months, post COVID infection, patient was suspected as mucormycosis and was subjected to bilateral FESS with debridement at another centre there he also received 1400mg of Inj. Amphotericin B. He presented to us with bilateral oro-antral fistula and an external fistula just below lateral canthus of the right eye. His right maxillary teeth were missing and the remaining had blackish discolouration. His palate and nose examination showed no slough or eschar. Right eye examination was normal with no ophthalmoplegia or loss of vision.

3D-CT face and MRI of PNS showed features of osteomyelitis of right maxilla.

Figure: 3D-CT face showing osteomyelitis of right maxilla

He underwent revision FESS with modified Denkers approach at our tertiary care centre.

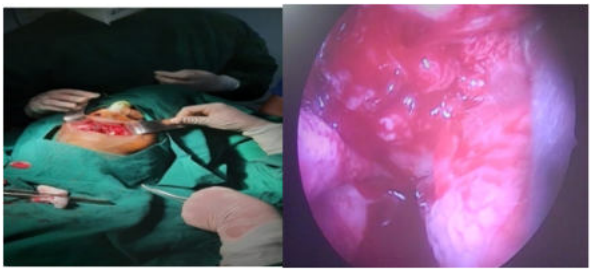

Figure: intra-operative image of FESS with modified Denkers approach

The histopathology of debrided tissue showed lining columnar epithelium with ulceration and underlying sub-epithelial tissue showing extensive necrosis and inflammation. Areas of hemorrhage, granulation tissue were seen. Necrotic bony trabeculae and actinomycotic colonies were noted. Actinomycotic colonies consisting of filaments peripherally and central basophillic core- RAY FUNGUS. Multiple bony fragments and fibro-collagenous tissue with

dense inflammatory infiltrates were also noted. Bone with empty lacunae suggestive of sequestrum also seen. On gram staining, gram positive filaments were noted and PAS staining showed no evidence of fungal hyphae.

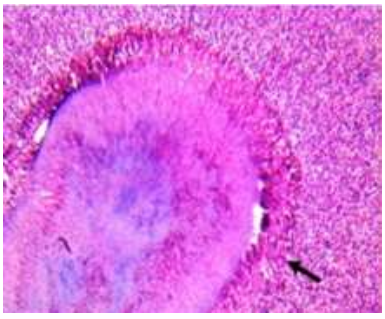

Figure: HPR showing Actinomycotic colonies of filaments peripherally and central basophilic core (H&E Stain, 40x).

Patient was advised oral Amoxycillin 500mg thrice a day for three months and discharged. Follow up was uneventful.

DISCUSSION

A broad spectrum of bacterial and fungal co-infection may be linked to COVID-19infection. There are very few case reports of co-infection of COVID-19, Mucormycosis and Actinomycosis.

The most prevalent species of actinomyces isolated in human infection is Actinomyces Israelii. 70% of orofacial infections are caused by A. Israelii and A. Gerencseriae. As such, it goes difficult to differentiate between true infection due to actinomyces and colonisation of mucosa contaminated samples unlessthe culture shows the organisms and histopathology shows the presence of neutrophils.

Gram staining shows the typical RAY FUNGUS appearance and is more sensitive than culture. Actinomycetes penetrate tissue, causing a persistent granulomatous infection that is typified by production of tiny clusters that are known as sulphur granules.[2]These form a tangle of fungal fragments and rosette formation of protein-polysaccharide complexes, whichinhibits phagocytosisand provide resistance to host defences.

The predisposing factors for most common actinomycosis clinical form- Cervico-facial actinomycosis also referred as ' lumpy jaw syndrome' are diabetes, malnutrition, male sex, immunosuppression, bad oral hygiene, mucosal trauma after local damage caused by irradiation, dental extraction, cervico-facial surgery and neoplastic conditions.

Computerised tomography and Magnetic Resonance Imaging may exhibit generalised soft tissue and skin involvement but are useful to assess bony involvement.[2]When osteomyelitis is suspected histopathology and bacterial culture of the suspected bone remain the gold standard of diagnosis. Along with surgical drainage of abscess and debridement of necrotic bony tissue, beta lactam antibiotics are the preferred treatment.[2]

In COVID infection the use of high dose of steroids and drugs that suppresses immunity, there is reduce function of polymorphs, in addition to severe lymphopenia, which helps invasion of mucorales.[2]Repeated surgical debridement along with anti-fungal therapy- Injection Amphotericin is the mainstay of treatment for invasive mucormycosis. COVID -19 contributed by causing immune-suppression helping the colonisation of actinomycosis species. Tissue necrosis and debridement leading to break in mucosa in mucormycosis led to continuous encroachment and expansion of actinomycosis. In mucormycosis, the presence of necrotic tissue provide an anaerobic environment for the growth of actinomycosis species as the cellular exchange is hampered.[2]Beta lactams are the antibiotics of choice along with drainage of abscess and debridement of necrotic bony tissue.[2] Our patient responded well to oral Amoxycillin 500mg thrice a day for three months post-surgical debridement by modified Denker's approach.

CONCLUSION

From our case study we draw the conclusion that there is a synergestic relationship between the three diseases: actiomycosis is caused by both mucormycosis and COVID-19.[2] The increase incidence of invasive mucormycosis in post COVID infection cases required aggressive debridement. COVID -19 contributed by causing immune-suppression helping the colonisation of actinomycosis species. Thus, the take home message is that all patients with mucormycosis who undergo an aggressive debridement should be closely monitored and checked for any signs of actinomycetes infection, as it is a difficult disease to diagnose. Fortunately early diagnosis and treatment are directly proportional to good prognosis.[2]

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