Issue 26-December 2023

ISMM MYCOSES Newsletter

Message of the President

Dear everyone, it is a pleasure indeed to be connecting again. Year 2023 is coming to a close and looking back it has been more than a satisfying year for the ISMM. The young, dynamic and committed members have propelled the society in this journey. The steps taken with their innovative and thoughtful ideas –

- Helped us achieve a significant increase in the number of members' registration
- We also succeeded in conducting academic events with almost all members of the ISMM participating as resource faculty.

This has strengthened our commitment to the cause of clinical mycology in our country.

Looking ahead, let us continue our work with greater zeal in the year 2024 to ensure mycoses is manageable for medical fraternity across the streams in our country. It will also be preparation time for our next biennial conference at Chennai hosted by Dr. Anupma J. Kindo.

Wishing everyone and your dear ones, a wonderful Christmas season, Happy New year and a year filled with happiness, health, peace and greater achievements.

Jayanthi Savio
President, Indian Society of Medical Mycologists

Report of General Secretary

Greetings ISMM members,

I hope everyone is doing well. It is a huge honour for me to be entrusted with the General Secretary position for the Indian Society of Medical Mycologists (ISMM). ISMM brings medical mycologists from across the country together on a single platform and tries to combat the threats of fungal infections. As promised in my earlier newsletter report, I will try my best to take our society to a new height. So, I am glad to report here some of our society's recent activities.

We have conducted four Executive Council (EC) Meeting till date, with one special meeting. We had already conducted the first two meetings earlier, which I covered in my first newsletter. The third EC meeting was held on 1st September 2023 where three major issues were discussed:

- The committee decided that out of three designates, including the President, Secretary, and Treasurer, two can make financial decisions for the ISMM, if formally approved in the next GBM.
- One of the hurdles of getting new membership was the payment method. The process is now streamlined, and a direct online payment method has been implemented with my active involvement.
- Dr. Vinay proposed to conduct an online webinar for fungal disease awareness week from 18-22 September 2023, which was unanimously agreed upon. A decision was also taken to start a special membership drive, to be started from the first week of September until the end of this year. There will be discounted membership fees for new members who will join in this period and the drive will run till the 31st December 2023.

The fourth online ISMM EC meeting was held on 5th December 2023. The President and Secretary thanked Dr. Vinay, Dr. Pratibha, Dr. Harsimran and Dr. Arghdeep for successfully conducting the aforementioned webinar for fungal disease awareness week. The General Secretary announced that a total of 85 new members joined in special membership drive. The decision was made to increase the deadline of new membership until 31st March 2024. Dr. Vinay discussed and proposed society should do some activity regularly (either once or twice a month) to make it more vibrant and improve its culture. All the members agreed and suggested to have once in a month. The committee decided to start an online presentation which will be held on the third Friday of every month from 2.30-3.30 PM. A subcommittee formed with four young members including Dr. Vinay, Dr. Pratibha, Dr. Harsimran and Dr. Arghdeep to make a schedule and topics for the same. Committee also decided to include all the awardee in any platform related to the medical mycology to be published in newsletter from now.

I want to also mention some of other recent activities of our society. Out of proposed 4 Pfizer-sponsored ISMM workshops two have been conducted at New Delhi AIIMS and St. Johns Bangaluru earlier which was covered in the last newsletter. The Third Pfizer ISMM workshop was conducted by Dr. Sanjay Bhattacharya at Tata Medical Center, Kolkata from 4-6th September 2023.The fourth and final ISMM workshop was conducted by Dr. Umabala at the Nizam Institute of Medical Sciences Hyderabad from 5-8th October 2023. All the workshops were very successful. It was a pleasure to see the response and enthusiasm of the participants.

The ISMM society conducted an online webinar for Fungal disease awareness week from 18-22 September 2023. A total of 13 speakers delivered online presentation in 5 days. The response was very encouraging and on an average approx. 250 interested participants actively joined and enjoyed different aspects of recent medical mycology topics, one of the demands from those participants was to have more such type of online activity in future.

Our next ISMM conference will be in February 2025 at SRM Medical College, Chennai. Dr. Anupama has already published the 1st brochure and she requested date from 21st – 23rd February 2025 to all the society members for active participations. We assured all the help from our society for the successful execution of this important event.

I am signing off with best wishes for the upcoming new year!

Dr. Anup K Ghosh
Secretary, Indian Society of Medical Mycologists

Indian Society of Medical Mycologists Awards

1. **Dr. M. J. Thirumalachar Life Time Achievement Award.**

   The Life Time Achievement award is established to honor members of the ISMM, who during the span of his/her lifetime have demonstrated a longstanding commitment to the cause of Medical Mycology in India. The award is made possible by a generous donation by one of the senior most and revered member of the Society, Dr. Arvind A. Padhye,

   The award would recognize the significant contribution to the understanding and application of the knowledge pertaining to the Medical Mycology in India, over the entire course of his /her life time, with a definable body of work through one or more of the following:-

   - Teaching /Training.
   - Research.
   - Publications/patents.
   - Patient care.

Who may receive the award?

The nominee should be a Life member of the ISMM in good standing, He should be in the field for at least 25 years but not necessarily active professionally at the time of receiving the award.

He must be alive at the time the selection committee's choice is announced. In case of an unfortunate event of death of the awardee after selection, the award may be presented posthumously.

How will the recipients be chosen?

The president, with the approval of the executive committee, will appoint a Life Time Achievement Awards committee consisting of five active members of the Society. One committee member shall be a current member of the ISMM executive council, who would co-ordinate the committee meeting. The committee will invite nominations from the members for the award. The nomination is to be made by at least two life members of the society at least 6 months in advance to the next annual conference of the society. Self-Nomination will not be accepted.

The nominations will be scrutinized by the award committee and the best among the nominations will be selected for the award.

When will the award be presented?

The award may be presented to the deserving individual at the Annual Conference of the Society. The awardee will be introduced to the august gathering duly stating his/her achievements during the inaugural function of the conference.

The award will consist of a citation and a memento.

No travelling or daily allowance will be provided to the awardee to attend the function.

The decision of the award committee will be final.

2. **G. P. Agarwal young scientist Award**

   The best paper award will be given to a young scientist below the age of 35 years (proof of age to be submitted). Applicant must submit the full length original research paper on any area of the medical mycology. Oral presentation of the research should be done in the separate award session during the conference.

3. **Dr. Pankajalakshmi Venugopal Glaxo Meritorious Award**

   Age limit -35 years (proof of age to be submitted). Must submit the curriculum vitae with list of publications and reprints of the papers in the field of medical mycology. Award will be given on the basis of the CV for the outstanding work in the field of medical mycology.

4. **Dr Kamalam Glaxo award in Dermatomycology**

   Applicant must submit full length research paper in duplicate in the field of dermatomycology. Award will be given based on oral presentation in the separate award session during the conference.

A Case of Cutaneous Histoplasmosis in an Immunocompetent Patient

A Case of Cutaneous Histoplasmosis in an Immunocompetent Patient

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Introduction

Histoplasmosis, caused by the dimorphic fungus *Histoplasma capsulatum*, is a systemic mycosis with varied clinical manifestations, most common being pulmonary. Disseminated histoplasmosis can occur in individuals with compromised immune systems such as those with HIV/AIDS, hematologic malignancies, solid organ transplant recipients, or individuals receiving immunosuppressive therapy. Disseminated cutaneous histoplasmosis is an exceedingly rare presentation, characterized by the involvement of the skin in the context of disseminated disease [1]. *Histoplasma capsulatum* is endemic in certain regions worldwide, including the America, Africa, and Asia [2].

Cutaneous involvement in disseminated histoplasmosis is particularly unusual, accounting for only a small fraction of cases [3], the skin lesions may present as papules, nodules, ulcers, plaques, or abscesses, often mimicking other infectious or neoplastic processes. In addition to the skin, other organ systems including the liver, spleen, bone marrow, and gastrointestinal tract, may be affected, further complicating the clinical picture. The disseminated histoplasmosis even cutaneous involvement sometimes carries high morbidity and mortality hence early diagnosis is necessary. The diagnostic modalities include histopathological examination, fungal cultures, molecular techniques and serology. Prompt initiation of antifungal therapy, such as amphotericin B or itraconazole, is essential to improve outcomes and prevent disease progression [4].

Here we present a challenging case of disseminated cutaneous histoplasmosis in an immunocompetent patient, highlighting the diagnostic dilemmas and therapeutic considerations encountered.

Case report

A 41-year-old male presented to the dermatology outpatient department with skin lesions for the past 4 months. Six months back the patient was well when he started to develop low-grade fever on and off . Later he developed skin-colored to brownish papules, few with umbilication which ulcerated and caused atrophic scarring later (Figure 1, 2). At the same time, he started developing oral ulcers and throat pain leading to difficulty in swallowing. On the day of his first visit to the hospital his physical examination was unremarkable with a BP of 127/87 mmHg, pulse rate 86/min and respiratory rate at 16/min was recorded.

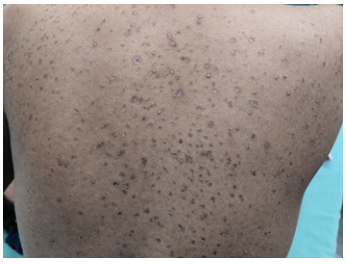

Figure 1: Skin-colored to brownish papules on the back

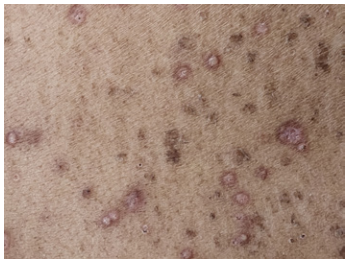

Figure 2: Some papules developed central ulceration and umbilication followed by atrophic scarring

On skin examination, multiple skin-colored to brownish papules with central umbilication and a few with central ulceration were observed. Multiple atrophic scars were present on the back, arms, legs, chest,

neck, face. A few similar lesions were also seen on the scalp. He had distal onycholysis (feet more affected than hands) with brownish discoloration and longitudinal ridging of the nails suggestive of subungual hyperkeratosis. The oral, ocular, nasal and genital mucosa was normal. On abdominal examination a deep tenderness was observed on bilateral hypochondrium and left lumbar area. The rest of the systemic examination was unremarkable. CECT chest and abdomen showed calcified mediastinal, cervical, and abdominal lymph nodes. The histopathology of skin lesions showed the presence of intracellular yeast cells, suggestive of histoplasmosis (Figure 3). He was started on suprabioavailable itraconazole 130 mg twice daily. The patient showed remarkable recovery, fever subsided within next few days and the skin lesions subsided in four weeks.

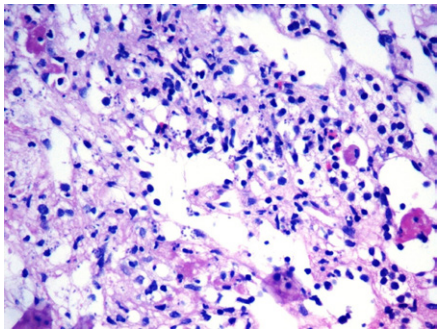

Figure 3: Histopathology of Histoplasma (H&E x400) showing intracytoplasmic yeasts

Discussion

Disseminated cutaneous histoplasmosis is a rare manifestation of *Histoplasma capsulatum* infection, typically observed in immunocompromised individuals. Rarely, immunocompetent individuals may develop disseminated disease with cutaneous involvement. In this discussion, we explore the unique aspects of disseminated cutaneous histoplasmosis in an immunocompetent patient, including the potential underlying mechanisms, diagnostic challenges, and treatment considerations.

Diagnosing disseminated cutaneous histoplasmosis in immunocompetent patients can be particularly challenging [5]. The skin lesions may resemble other infectious or neoplastic conditions, leading to misdiagnosis or delayed recognition. Histopathological examination of skin biopsy samples remains a crucial diagnostic tool, revealing characteristic findings such as granulomatous inflammation with intracellular yeast forms. Fungal cultures and molecular techniques, including polymerase chain reaction (PCR), can further confirm the presence of *Histoplasma capsulatum*. It is essential to maintain a high index of suspicion and consider histoplasmosis in the differential diagnosis when encountering immunocompetent patients with atypical cutaneous lesions [6].

Treatment strategies for disseminated cutaneous histoplasmosis in immunocompetent patients are similar to those employed in immunocompromised individuals. Antifungal therapy is the mainstay of treatment, with options including amphotericin B, itraconazole, or other azole antifungals. The choice of therapy depends on the severity of the disease, patient characteristics, and potential drug interactions. In some cases, a combination of antifungal agents may be necessary to achieve optimal outcomes. Timely initiation of treatment is crucial to prevent disease progression, reduce morbidity, and improve patient outcomes [7].

Long-term follow-up and monitoring are essential for immunocompetent patients with disseminated cutaneous histoplasmosis, as relapses can occur even after successful treatment. It is important to assess the patient's immune status and consider additional investigations to exclude underlying immunodeficiency, as the occurrence of disseminated disease in immunocompetent individuals raises the possibility of undiagnosed immune dysfunction.

The rarity of disseminated cutaneous histoplasmosis in immunocompetent patients limits the available evidence and clinical experience regarding optimal management. Further research is warranted to elucidate the specific risk factors and immunologic mechanisms associated with disseminated histoplasmosis in immunocompetent individuals, as well as to explore new diagnostic modalities and therapeutic approaches.

In conclusion, disseminated cutaneous histoplasmosis in immunocompetent patients remains an intriguing clinical entity. The understanding of the underlying mechanisms, diagnostic challenges, and treatment considerations in this context is still evolving. Healthcare professionals should maintain awareness of this condition and consider histoplasmosis in the differential diagnosis when evaluating immunocompetent patients presenting with unusual cutaneous lesions. Case reports and further research will continue to contribute to our knowledge of disseminated cutaneous histoplasmosis in immunocompetent individuals and guide optimal patient management.

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Disseminated *Talaromyces marneffei* and *Treponema pallidum* coinfection in a patient with AIDS

Disseminated *Talaromyces (Penicillium) marneffei* and *Treponema pallidum* coinfection in a patient with Acquired Immunodeficiency Syndrome (AIDS)

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Introduction

Talaromycosis is an opportunistic endemic mycosis prevalent in southeast Asia and in north east India [1] causing disseminated infection with high mortality. Global incidence of the disease has increased significantly as a result of the HIV pandemic, notably in the hyperendemic regions of southeast Asia (Myanmar, Thailand and Vietnam), north eastern India and east Asia (Taiwan, southern China and Hong Kong) [2,3].

The majority of the reported cases in India have their roots in Manipur including the first one reported from this centre previously [4,5] and other states of northeast like Assam, Meghalaya, Sikkim, Mizoram, Nagaland [4-9]. Two cases each have been reported from Kerala and Maharashtra [10], as well as one from Delhi [3]. Patient usually present with fever, weight loss, skin lesion, anemia, lymphadenopathy and hepatomegaly.

However, *Treponema pallidum* and *T. marneffei* infection, have been seldom documented to exist as co-infection. The literature was reviewed and no cases of concurrent infection with *T. marneffei* and *treponema pallidum* were reported in patients who were HIV positive. To our best of knowledge, this is the first case report documenting a patient who was HIV-positive and having concurrent infection with *T. marneffei* and *T. pallidum*.

Case Report

A 28 year old unmarried male currently resident of Delhi, presented with a 6 month history (since october 2022) of dry cough but not associated with dyspnea, loss of appetite, general malaise and body pain on 15/04/23 (day 0). During this time, he had lost approximately 12 kg body weight. His past medical history was not significant. He was bisexual, and having sexual intercourse with men (passive anal and oral sex). Patient informed having 5 partner, first contact at age of 23 and with single partner since last 6 month. Last sexual exposure on 22/5/22 with male. He was working in a private firm and had been living in South Delhi (Kisangarh, Vasant Kunj) since 2016. Patient was born in Manipur but relocated to Arunachal Pradesh at age of 3 in year 2000. 8 weeks after the cough and malaise, in December/2022 he noticed frequent on and off fever with chills, without additional symptoms which resolved on taking paracetamol. But later he developed a red papule over the philtrum initially dew drop size and then it gradually progressed over 3 months to reach to 2.5cm in size (Fig.1 A,B) and the lesion was associted with crusting. Similar kind of lesion developed over face, hands, abdomen, trunk, bilateral lower limb and penis within 2 month. The patient was then diagnosed as HIV positive on 2/3/2023 on routine investigation, with CD4 count 47 mm^3 and was started on antiretroviral therapy. He was advised to undergo screening for syphilis in view of penial lesion looking like hard chancre. VDRL was found to be reactive, later TPHA was positive with 1:1 titre on 6/3/23, Three doses of injection benzathine penicillin 2.4MU was administered by starting first dose on 13/3/23.

A chest X-ray was done in view persistent dry cough, which revealed mediastinal lymphadenopathy CECT (contrast enhanced computed tomography) scan of neck, chest and abdomen, revealed multiple centrilobular nodules showing tree in bud configuration in bilateral lung parenchyma. A non-enhancing soft tissue lesion in left peribronchial and subcarinal region, causing compression and luminal attenuation of upper thoracic esophagus. Multiple necrotic enlarged and homogenously enhancing lymph nodes in neck, mediastinum, mesentry, retroperitoneum left common internal iliac, bilateral external iliac and inguinal region which was assumed to be due to disseminated Koch's. Patient was started on antitubercular therapy (ATT), later on 24/3/23 and endoscopic ultrasound guided fine needle aspiration cytology (FNAC) from mediastinal lymph node was done which showed moderately cellular and lightly scattered benign squamous cells and few polymorph in a hemorrhagic background with no conclusive finding. No lymphoid tissue seen.

Patient was admitted to Safadarjung Hospital on 15/4/23(day 0) in view of non-resolving fever. He was emaciated thin built (47.7 kg), conscious, coherent and cooperative. On examination his blood pressure was 112/73 with pulse rate of 115/min, maintaining oxygen saturation 99% at room air, temperature 100°c there was multiple erythematous plaques largest measuring 3 x 3 cm over the upper lip and smallest measuring 0.5 x 0.5cm present over the face, trunk, upper limb and lower limb. Routine investigation was done along with dengue, chikungunya, scrub typhus and typhoid serology on day 0. His haemoglobin at admission was 7.8gm/dl, total leucocyte count 11.4k/dl, platelet count 4.58lakh/dl, LFT/KFT- values were under normal limits and serology reports came out to be negative (day 1).

Ultrasound of abdomen revealed irregular cystic area in lower pole of right kidney and well defined hyperechoic area of size of 0.6 x 0.7cm seen in segment VI of liver likely to be hemangioma. Chest xray was performed on 17/4/23 (day 2) and it revealed multiple discrete, tiny nodules diffusely distributed along the lung parenchyma suggestive of military TB. A serum *Aspergillus* galactomannan antigen testing (day ٢) was positive with ١٫٢ (cutoff index value ≥ ٠٫٥). Sputum cultures for respiratory pathogens, including mycobacteria and fungi, were negative. Sputum cytology testing was not performed. BAL was sent for CBNAAT testing for *Mycobacterium tuberculosis* which came out to be negative. Blood cultures and facial skin lesion biopsy drawn on admission (day 0) grew bluish green mold after 5 days of incubation. The mold was floccouse bluish green colonies that produced red diffusible pigment on Sabouraud dextrose agar at 25°C (fig.3.A) and transformed to yeast on incubation at 37°C (Fig.3.C,D,E) on BHI brain-heart infusion agar medium. Morphologically, mold form on LPCB revealed hyaline septate hyphae, with tapering phialides and round conidia in chain. It was sent to PGIMER (Postgraduate institute of medical education and research) chandigarh, India (National Reference Centre) for further confirmation and identified as *T. marneffei* by sequencing of the ribosomal DNA, ITS(internal transcribed spacer) region. Patient was treated with liposomal amphotericin B (3 mg/kg) for 14 days followed by tab itraconazole 200mg twice a day. Patient was discharged on oral itraconazole therapy on 15th day. Patient improved dramatically, his skin lesion resolved within 6-8 week leaving behind the scars, also his CD4 count raised to 430. Patient was advised to continue itraconazole, ART (dolutegravir 50mg, tenofovir 300mg, lamivudine 300mg), Tab. Septran DS (double strength) BD and Tab azithromycin to prevent from other opportunistic infection and capsule doxycycline 100mg BD for 3 weeks as patient has already received penicillin for syphills.

Discussion

The fungus was named in 1956 in honour of Dr. Hubert Marneffe, the director of the Pasteur Institute of Indochina, by Dr. Gabriel Segretain, who is credited with its discovery [11]. First known naturally developed human infection was recorded seventeen years later in an American missionary, 61yr old with Hodgkin's disease who had visited Southeast Asia. In 1989, Bangkok, Thailand reported the first instance of *T. marneffei* infection in a patient with HIV in Southeast Asia, coinciding with the commencement of the epidemic of HIV in the region [12]. Talaromycosis is the 3rd most prevalent opportunistic illness among AIDS patients in northern Thailand, following TB and cryptococcosis [11]. Despite the fact that the prevalence is not known worldwide, it has pooled prevalence of 3.6% among HIV-positive individuals, varying from 0.1% to 19.6% depending on the geographical area. [13] Uptill the end of 2018, thirty-three countries have reported 28.8 million cases, with roughly 17,300 infections and 4900 fatalities (2500-7300) every year [2]. Thailand, China and Vietnam have the highest talaromycosis incidence rates that have been documented. Although it is more common in patients with HIV/AIDS and people with functional defects of cellular immunity, notably deficits in CD4 T cell activity, *T. marneffei* can cause severe debillitating illness in immunocompetent host. [11] *It was initially found in Rhizomys sinensis (bamboo rats) and other bamboo rat species found in an endemic region.* It is known that the bamboo rat serves as a significant natural host reservoir for *T. marneffei.* [11,14-15]

A significant risk factor for *T. marneffei* infection is immunodeficiency, particularly at CD4 levels below 100 cells/L. [11,14-15] As was seen in this patient, CD4 count was 47 at time of diagnosis. *It predominantly affects the lung that spreads by lymphatic or hematogenous pathways to other internal organs.* [11] The most frequent symptoms in HIV+ individuals are fever, loss of weight, weakness, anaemia, lesions on the skin, hepatosplenomegaly, and lymphadenopathy, listed according to their order of frequency as obsereved by Ranjana et al

[14] and Sethuraman et al [15]. The patient of the current case study presented with fever, cough and lymph node enlargement and skin lesion. Being vague and nonspecific these symptom often result in misdiagnosis.

The clinical relevance of a misdiagnosis is that fungal infections are probable in patients with immunodeficiency disorders who have prolonged fever after receiving broad spectrum antibiotic therapy and in these patients, concomitant opportunistic infections should be taken into consideration. Clinically, infections caused by *Histoplasma capsulatum*, *Nocardia* spp. and *Mycobaterium tuberculosis* is difficult to distinguish from *T. marneffei* manifestation. Therefore, it is important to consider and confirm any concurrent infections with two or more organisms by additional testing. Due to the presence of mixed infections, disseminated *T. marneffei* is challenging to diagnose and treat.

The patients presented in the current case study received intravenous amphotericin with oral itraconazole, immediately following the diagnosis of *T. marneffei* infection. The symptoms of fever, cough and skin lesion improved gradually following treatment although, it was unclear from these findings whether the patient›s *T. pallidium* infection developed before or after developing talaromycosis,

The present case study provides important clinical evidence indicating that the symptoms caused by two different pathogen in a concurrent infection may be identical. Thus, the risk of coinfection should be taken into account if a patient reacts poorly to intial treatment as was seen in this case. There is presently no defined standard treatment for *T. marneffei* infection, although some studies have shown that amphotericin B liposomal was successful in treating *T. marneffei* infection and was advised as first therapy. [16,17] In the current case the patient was successfully treated with amphotericin B followed by itraconazole.

Conclusion

Clinicians should be fully aware of the possibility of concurrent infections with *T. marneffei* and other opportunistic pathogens. For immunosuppressed patients, early diagnosis and treatment are crucial for improving patient prognosis as these patients present with multiple infection as was seen in this case.

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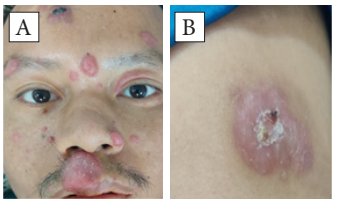


Fig.1 (A,B) Before starting treatment-reddish, papular, firm lesion measuring 2.5*2.5cm on philtrum , face and arm. (B)The lesion on arms shows central necrosis.

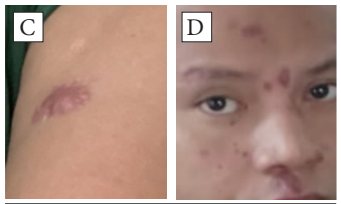


Fig. 2 (C,D) post 8 weeks of starting treatment lesion resolevd leaving scar and hyperpigmentation.

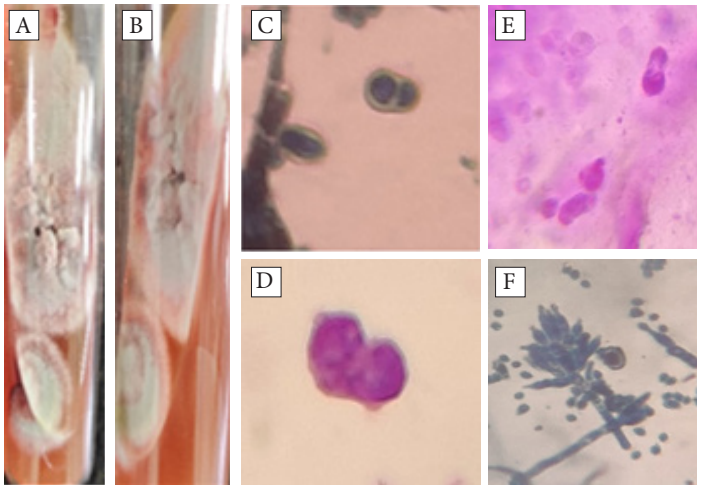
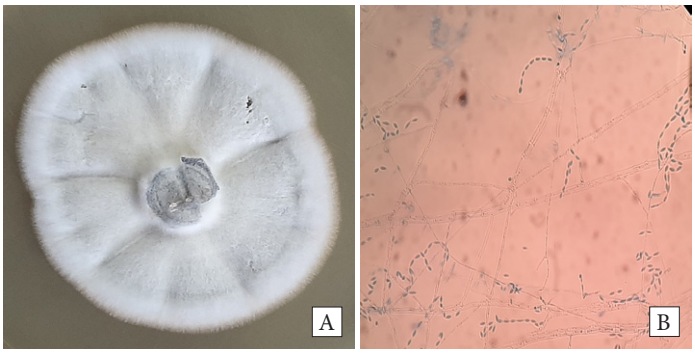


Fig. 3 Biopsy from skin lesion showing (a,b) flat powdery blusih-green red growth on obverse of SDA media with soluble deep red pigment diffused can be clearly appreciated on reverse seen after 5 days of incubation at 25°c. (c,d,e) At 37°c - typical yeast with transverse septum stained with gram stain and on LPCB mount seen.(f) *T. marneffei* hyaline septate hyphae with single conidiophores, with tapering flask like phialides bearing chains of conidia; intact hyphae on incubation showing arthocondiogenesis.

Answer for the last issue's identify the fungus

Answer for the last issue's identify the fungus (ISMM mycoses, Issue 25, Quiz June 2023)

A 60-year-old male with history of renal transplant one year back presented with memory disturbances, occasional headache for 1 month and right sided hemiparesis for 8 hours. He had no history of recent travel. A non-contrast computerized tomography (NCCT) scan of the head revealed a left thalamic hypodensity (1 × 2 cm). Brain T2 magnetic resonance imaging (MRI) showed ring-enhancing lesion suggestive of abscess. Lumbar puncture was performed, and cerebrospinal fluid (CSF) depicted elevated glucose (136 mg/dL) and protein (160 mg/dL) while microscopy and culture did not show any significant finding. Stereotactic biopsy of the thalamic brain lesion third day revealed frank pus which showed septate hyphae in potassium hydroxide (KOH) mount and grew downy, white colonies on Sabouraud dextrose agar (SDA) within 48 hours of incubation (Fig A). The lactophenol cotton blue mount from culture shows thin erect conidiophores arising singly with short phialides and limoniform single-celled conidia in long chains (Fig B).



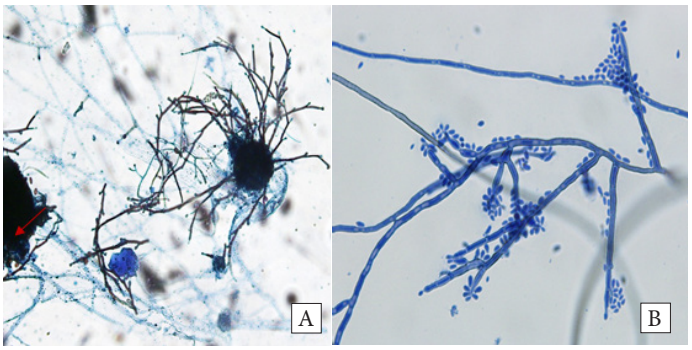
Correct identification: *Acrophialophora fusispora*

(Dr. Bishal Gupta (LM-584), Senior resident, Calcutta school of tropical medicine, Kolkata)

Quiz: Can you identify the fungus?

Quiz: Can you identify the fungus?

A 40-year-old female presented with rhinorrhoea, and right nasal obstruction for past 2 weeks. She had no history of any comorbidity or illness. X-ray of maxillary region showed complete opacity of the right maxilla. The erosion of the antral bone was also appreciated. Computerized tomography (CT) scan of paranasal sinuses revealed opaque mass in the right maxillary sinus. The debris from the antrum was removed and subjected to potassium hydroxide (KOH) mount which showed branched septate hyphae and grew yellowish white colony on Sabouraud dextrose agar (SDA) after 4 days of incubation. The lactophenol cotton blue (LCB) mount from culture is shown in figures A & B. Please identify the fungus to species level.



Send your answer to Dr. Harsimran Kaur at drharsimranpgi@gmail.com

Results of ISMM Mycology External Quality Assurance Program conducted at PGIMER, Chandigarh

Performance Report of the Participants (29th Batch-A, July 2023)

Total number of participating laboratories -82

(EQMM-5) Minimum inhibitory concentration	Ampho tericin B 0.5mg/L	Flucona zole 2.0mg/L	Vorico nazole 0.06mg/L	Itraco nazole 0.5mg/L	Posa Conazole 0.25mg/L	Caspo fungin 0125mg/L	Anidula fungin 0.25mg/L	Mica fungin 0.3mg/L
Participants results %	48.52%	50%	45.58%	27.94%	26.47%	38.97%	23.52%	30.88%

S No.	Sample/ Code	Clinical details			Correct identification	Interpretation	Laboratory (%) given correct results
		Age/Sex	Clinical feature/ Diagnosis	Source of specimen			
1	EQMM-1	2yrs/M	Cystic fibrosis, pneumonia	Bronchoalveolar Lavage	*Aspergillus terreus*	Invasive pulmonary aspergillosis	85%
2	EQMM-2	53yrs/F	Itchy, scaly lesion on arm	Skin scraping	*Microsporum canis*	Dermatophytosis	61%
3	EQMM-3	60yrs/M	Brain abscess	Pus from brain abscess	*Scedosporium apiospermum*	Cerebral scedosporiosis	63.2%
4	EQMM-4	30yrs/M	H/O Roadside accident, wound infection	Skin biopsy	*Lichtheimia corymbifera*	Cutaneous mucormycosis	75.8%
5	EQMM-5*	80yrs/F	Sepsis	Blood culture	*Candida glabrata*	Candidemia	80%

Results of antifungal susceptibility testing (AFST) performed for EQMM-5 Laboratories participating in AFST –77.5 %

(EQMM-5) Minimum inhibitory concentration	Ampho tericin B 1.0mg/L	Flucona zole 0.5mg/L	Vorico nazole 0.03mg/L	Itraco nazole 0.5mg/L	Posa Conazole 0.25mg/L	Caspo fungin 0.5mg/L	Anidula fungin 1mg/L	Mica fungin 0.5mg/L
Participants results %	67.52%	67.5%	70%	50%	46.25%	68.75%	20.2%	63.75%

Performance Report of the Participants (29th Batch-B, July 2023)
Total number of participating laboratories -85

S. No.	Sample/ Code	Clinical details			Correct identification	Interpretation	Laboratory (%) given correct results
		Age/Sex	Clinical feature/ Diagnosis	Source of specimen			
1	EQMM-1	64yrs/M	Fever, cough, hemoptysis	Bronchoalveolar Lavage	Paecilomyces variotii	Invasive pulmonary mycosis by P. variotii	87%
2	EQMM-2	50yrs/F	Yellowish, Thickened nail	Nail clippings	Trichophyton ajelloi	Onychomycosis	63%
3	EQMM-3	4yrs/F	Painful swelling on abdominal wall	Skin biopsy	Basidiobolus ranarum	Basidiobolomycosis/ Entomophthoro-mycosis	58.6%
4	EQMM-4	30yrs/M	Stem cell transplant recipient, pneumonia	Endotracheal aspirate	Lomentospora prolificans	Fungal pneumonia by L. prolificans	53.3%
5	EQMM-5*	2months/F	Sepsis	Blood culture	Candida krusei	Candidemia	87%

Results of antifungal susceptibility testing (AFST) performed for EQMM -5 Laboratories participating in AFST –81.7 %

(EQMM-5) Minimum inhibitory concentration	Ampho tericin B 1.0mg/L	Flucona zole 0.5mg/L	Vorico nazole 0.03mg/L	Itraco nazole 0.5mg/L	Posa Conazole 0.25mg/L	Caspo fungin 0.5mg/L	Anidula fungin 1mg/L	Mica fungin 0.5mg/L
Participants results %	71%	80.4%	78%	57.3%	56.09%	75.6%	25.6%	65.85%

Abstracts ((July – December 2023)

Compiled by Dr. Joveeta Joseph
Microbiologist, Jhaveri Microbiology Centre, L V Prasad Eye Institute, Hyderabad

1. Prevalence, Risk Factors, and Impact of Bacterial or Fungal Infections in Acute Liver Failure Patients from India

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[#]Contributed equally.

Dig Dis Sci. 2023 Oct;68(10):4022-4038. doi: 10.1007/s10620-023-07971-9.

Abstract

Background: We evaluated the prevalence, risk factors, and impact of bacterial/fungal infections in acute liver failure (ALF) patients.

Methods: We analyzed clinical, biochemical, and microbiological data of ALF patients with and without bacterial/fungal infections admitted at an institute over the last 5 years.

Results: We enrolled 143 patients, 50% males, median age 25 years, with acute viral hepatitis (32.2%), drug-induced injury (18.2%), and tropical illness (14%) as aetiologies of ALF. 110 patients (76.9%) developed bacterial/fungal infections [Bacterial infection: MDR: 70%, PDR: 7%, ESBL: 40%, CRE: 30%, CRAB: 26.6%, MDR-EF: 13.3% and fungal infection: 19 (17.3%)]. On univariable analysis, SIRS (33.6% vs.3%), ICU admission (78.2% vs. 45.5%), mechanical ventilation (88.2% vs. 51.5%), inotropes (39.1% vs. 6.1%), invasive catheters (91.8% vs. 39.4%), and prolonged catheterization (6 days vs. 0 days) were significant risk factors for infections ($p < 0.05$, each). In contrast, SIRS and catheterization independently predicted infection on multivariable regression. Organ failures [3 (2-4) vs. 1 (0-2)], grade-III-IV HE (67.3% vs. 33.3%), circulatory failure (39.1% vs. 6.1%), coagulopathy (INR > 2.5: 58.2% vs. 33.3%), renal injury (28.2% vs. 6.1%) ($p < 0.05$), MELD (32.9 ± 8.2 vs. 26.7 ± 8.3) and CPIS [3(2-4) vs. 2(0-2)] were higher in infected vs. non-infected patients ($p < 0.001$). 30-day survival was significantly lower in infected vs. non-infected patients (17.3% vs. 75.8%, $p < 0.001$), while no patient survived with fungal infections. Refractory septic shock was the commonest cause of mortality in patients.

Conclusions: Infections due to MDR organisms are high, fungal infections are fatal, and refractory septic shock is the dominant reason for mortality, implying bacterial and fungal infections as the major killer in ALF patients.

Keywords: Acute liver failure, Fungal infections, Infections, Multidrug-resistance.

PMID: 37578566

2. Risk Factors, Clinical Manifestations, and Outcomes of COVID-19-Associated Mucormycosis and Other Opportunistic Fungal Infections

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Cureus. 2023 Sep 30;15(9):e46289. doi: 10.7759/cureus.46289.

Abstract

Introduction: An epidemic of opportunistic fungal infections during the second wave of the coronavirus disease 2019 (COVID-19) pandemic badly affected India in 2021. Several unknown, unique factors played a role in its causation and survival outcomes, including the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. The purpose of this study was to analyse the probable underlying risk factors and to know immediate and late outcomes of opportunistic fungal infections in the unique setting of the SARS-CoV-2 pandemic.

Methods: In this retrospective cohort study, clinical records of COVID-19-associated opportunistic fungal infections were reviewed for risk factors, clinical features, microbiological and pathological findings, and outcomes during a one-year follow-up at a tertiary care teaching hospital in Northern India.

Results: A total of 390 patients were admitted with symptoms and clinical signs consistent with the criteria for the diagnosis of COVID-19-associated mucormycosis (CAM). Diabetes mellitus was the most common comorbidity (74%). During the management of SARS-CoV-2, 192 (49%) patients received corticosteroids, 151 (39%) were on oxygen support, and 143 (37%) used at-home steam inhalation. Masks of any type were used by 236 (60.5%) patients, of whom most used cloth masks (n=147, 37.6%). Microbiologically, fungal growth was positive in 138 (35.3%) samples; of these, 74 (19%) had non-Mucorales fungal colonies. The fungal infection invaded structures beyond the paranasal sinuses in 60% of the cases. The overall mortality in this cohort after one-year follow-up was 40.25%.

Conclusions: An alignment of several predisposing conditions precipitated an epidemic of opportunistic fungal infections during the COVID-19 pandemic that resulted in high mortality in affected patients.

Keywords: Covid associated mucormycosis, Covid-19, Immunosuppression, Mortality, Mucormycosis, Opportunistic fungal infections.

PMID: 37915866

3. Homeopathic Medicines in the Management of Dermatophytosis (Tinea Infections): A Clinico-epidemiological Study with Pre-post Comparison Design

Ashish Kumar Dixit[1], Danish Javed[2], Amit Srivastava[2], Renu Bala[3], Nibha Giri[4]

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[4]State Homeopathic Dispensary, Ghazipur, Uttar Pradesh, India.

Homeopathy. 2023 Nov 1. doi: 10.1055/s-0043-1771023.

Abstract

Background: Dermatophytosis is a common fungal infection of the skin and nails. Insufficient data exist regarding the clinico-epidemiological profile of dermatophytosis and the usefulness of individualized homeopathic medicines (IHMs) for patients visiting a homeopathy outpatient department (OPD).

Objectives: This article undertakes a clinico-epidemiological profiling of dermatophytosis and the usefulness of IHMs in its management.

Methods: This open-label, pre-post, comparative observational study was conducted in a homeopathy OPD from November 2018 to February 2020. IHMs were prescribed based on symptom totality and repertorization. A numeric rating scale (NRS) and the Dermatology Life Quality Index (DLQI) patient questionnaires were used, and results were analyzed using SPSS-IBM version 20.

Results: Data from a total of 103 patients, mean age 29.65 ± 15.40 years, were analyzed. *Tinea cruris* was the most common infection (29.1%), followed by *Tinea corporis* (13.6%). After 3 months of treatment, significant reductions in NRS and DLQI scores were observed (8.51 ± 1.24 to 0.59 ± 0.83, $p < 0.001$, and 16.28 ± 5.30 to 1.44 ± 1.56, $p < 0.001$, respectively), with Sepia (15.5%), Sulphur (14.6%), Calcarea carbonica (11.7%), Natrum muriaticum (9.7%) and Bacillinum (8.7%) being the most frequently prescribed medicines. There was no significant correlation between occupation, sex, home location or marital status and the clinical types of dermatophytosis. No adverse events were reported.

Conclusion: *T. cruris* and *T. corporis* were prevalent dermatophytic infections. The decrease in NRS and DLQI scores associated with homeopathy indicates its usefulness as an integrative treatment option for dermatophytosis. Further research in larger and more diverse population samples is needed.

Keywords: Dermatophytosis, Homeopathy, Numeric rating scale, Dermatology Life Quality Index

PMID: 37913793

4. Demographic and microbiological profile of corneal ulcer patients presenting at a tertiary healthcare center of Eastern India during the COVID era: A hospital-based cross-sectional study

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Indian J Ophthalmol. 2023 Nov;71(11):3522-3527. doi: 10.4103/IJO.IJO_2752_22.

Abstract

Purpose: To determine the demographic and microbiological profile involved in the causation of corneal ulcers in Eastern India during the COVID era.

Method: Patients presenting with corneal ulcers fulfilling the inclusion and exclusion criteria were taken as the case. The study duration was from January 2021 to December 2021. Socio-demographic details and information about risk factors were noted. A detailed corneal examination followed by corneal scraping was performed for microbiological evaluation.

Results: In 1 year, 99 infective corneal ulcer patients were evaluated. Farmers (24.2%) were found to be maximally affected by corneal ulcers. The peak in cases was recorded from October to December (38.4%). Ocular trauma was the commonest risk factor (42.4%). The majority (80.8%) of patients were already on some topical antimicrobials. 22.2% of samples showed fungal filaments on KOH mount; 54.5% of these cases turned out to be culture-positive. 17.56% of KOH-negative samples turned out to be culture-positive (fungal). Overall, the culture positivity rate was 28.28% out of which fungal isolates were 89.28% and bacterial isolates were 10.72%. *Fusarium species* were identified as the most common organism contributing 42.85%, followed by *Aspergillus fumigatus* (14.28%). 10.72% of cases were culture positive for *Pseudomonas aeuroginosa*.

Conclusion: Trauma with the organic matter was the predominant cause of fungal keratitis. In this study, fungal keratitis was found to be more common. *Fusarium* was the most common isolate.

Keywords: Corneal ulcer, Eastern India, Demography.

PMID: 37870018

5. Granulomatous mastitis: A diagnostic challenge-3 year single institutional experience

Adil Aziz Khan[1], Sana Ahuja[1], Sufian Zaheer[1], Charanjeet Ahluwalia[1], Mukul Singh[1], Sachin Kolte[1], Sunil Ranga[1]

Affiliations

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Diagn Cytopathol. 2023 Oct 13. doi: 10.1002/dc.25241.

Abstract

Background: Granulomatous mastitis (GM) is often clinico-radiologically misdiagnosed as breast malignancy. Tuberculosis, foreign body reactions, fungal and parastic infections, and autoimmune diseases can cause GM. The present study aimed to assess the spectrum of GM on fine-needle aspiration biopsy (FNAB) smears along with its histopathological and clinico-radiological findings.

Materials and methods: It was a retrospective study which included all cases of GM diagnosed on FNAB over a period of 3 years. The histopathological diagnosis was retrieved, wherever possible. All the FNA smears and histopathological sections were reviewed for the presence of epithelioid granulomas, necrosis, epithelioid histiocytes, inflammatory cells including plasma cells, neutrophils, eosinophils, multinucleated giant cells, and epithelial component and associated atypia, if any. The inflammatory cells and multinucleated giant cells were graded on a scale of 0 to 3+ in every case.

Results: Among the 22 cases evaluated, the most common inflammatory infiltrate was lymphocyte followed by neutrophils and eosinophils. Caseous necrosis was appreciated in 7 (31.8%) cases, out of which 5 (22.7%) were diagnosed as tubercular mastitis on FNA smears. Ziehl Neelson stain was done in all FNAB smears and AFB was positive in 7 (31.8%) cases. Histopathological correlation was available for 14 cases (63.6%). The most common diagnosis on histopathology was idiopathic GM having lobulo-centric granulomatous inflammation, epithelioid histiocytes, neutrophils, and lymphocytes.

Conclusion: FNAB is a reliable and minimally invasive tool to diagnose tubercular mastitis, idiopathic GM and also ruling out clinicoradiological suspicion of malignancy. Careful examination of cytological smears can prevent an unnecessary biopsy in granulomatous lesions of breast.

Keywords: Epithelioid, Granulomatous mastitis, Idiopathic granulomatous mastitis, Necrosis, Tubercular.

PMID: 37830385

6. Post-COVID-19 rhino-orbito-cerebral mucormycosis-A clinico-mycological study from North India

Juhi Taneja[1], Kuhu Chatterjee[1], Jaseetha Sasidharan[2], Syed Zafar Abbas[3], Anil Kumar Rai[2], Sujata Raychaudhury[4], Bhabatosh Das[5], Asim Das[6]

Affiliations

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[6]ESIC Medical College & Hospital, Faridabad, India.

Med Mycol. 2023 Jul 6;61(7):myad067. doi: 10.1093/mmy/myad067.

Abstract

The second wave of coronavirus disease 2019 (COVID-19), during the early 2021, lead to a devastating outbreak of mucormycosis in India. This study aimed to determine the aetiology, clinical features, comorbidities, and risk factors of rhino-orbito-cerebral mucormycosis (ROCM) and antifungal susceptibility pattern for the isolates. The study included all suspected cases of ROCM in post-COVID-19 patients attending the hospital from May to December 2021. A total of 70 patients were diagnosed with mucormycosis during the study period. The commonest presentations were rhino-orbital and rhino-orbito-cerebral in 35.7% of cases each. Diabetes mellitus was the commonest associated risk factor in 95.7% of all patients, while 78.5% of the patients were treated with corticosteroids in the recent past, and 25.7% presented with active COVID-19 pneumonia. The commonest isolate was *Rhizopus arrhizus* n = 14, followed by *Aspergillus flavus* n = 16, *A. fumigatus* n = 4, *A. niger* n = 3, *Fusarium oxysporumn* = 1, and *Apophysomyces variabilisn* = 1. Fungal species identification was done by phenotypic methods for all the isolates and DNA sequence analysis of 18 isolates, and antifungal susceptibility testing of 30 isolates was performed by commercially prepared HiMIC plate (HiMedia, Mumbai, India) using broth microdilution for amphotericin B, isavuconazole, itraconazole, voriconazole, and posaconazole. The MIC50 and MIC90 of amphotericin B for *R. arrhizus* strains were 0.25 and 4 µg/ml, respectively; and the MIC50 and MIC90 results for itraconazole, posaconazole, and isavuconazole were 8 and 8, 2 and 2, and 2 and 8 µg/ml, respectively. In vitro data showed that amphotericin B was the most effective antifungal against most species. The commercially available ready-to-use minimum inhibitory concentration plates are user-friendly for performing antifungal susceptibility, which may be useful in choosing appropriate regimens and monitoring emerging resistance.

Keywords: COVID-19-associated mucormycosis, Amphotericin B, Mucormycosis, Rhino-orbito-cerebral mucormycosis, Antifungal susceptibility.

PMID: 37442616

7. Primary Cutaneous Mucormycosis: A Necrotising Soft Tissue Infection with Poor Prognosis

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[2]Department of Microbiology, Government Medical College and Hospital, Sector 32 Chandigarh, India.

Infect Disord Drug Targets. 2023;23(6):e040523216523. doi: 10.2174/1871526523666230504114801.

Abstract

Background: Cutaneous mucormycosis is an unusual fungal infection that continues to occur. It needs aggressive surgical debridement and timely administration of antifungals due to its high fatality rate. High clinical suspicion on the part of a surgeon is required to prevent the same.

Case presentation: We present two cases of cutaneous mucormycosis in which the patients succumbed to death, highlighting the seriousness of the condition. One patient had a lower leg ulcer and was diabetic, and the other patient had a gluteal abscess following an intramuscular injection. Tissue samples grew *Rhizopus arrhizus* and *Apophysomyces sp*., respectively. Both patients were treated with amphotericin B, and extensive debridement was performed.

Discussion: Cutaneous mucormycosis can be reported in immunocompetent people, and there is a need for early recognition of the entity as a differential diagnosis of any nonhealing necrotic ulcer.

Conclusion: Proper training and education of technical and clinical

staff should be done at peripheral primary and secondary care centres so as not to miss out on cases of mucormycosis and for better prognosis in a cutaneous variety of mucormycosis in surgical patients.

Keywords: Cutaneous, Rhizopus, Apophysomyces, Mucormycosis, Necrotizing, Prognosis, Surgical patients.

PMID: 37150984

8. Magnetic resonance imaging in COVID-19-associated acute invasive fungal rhinosinusitis - Diagnosis and beyond

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J Clin Imaging Sci. 2023 Aug 9:13:23. doi: 10.25259/JCIS_46_2023. eCollection 2023.

Abstract

Objectives: The aim of the study was to evaluate the magnetic resonance imaging (MRI) features of acute invasive fungal rhinosinusitis (AIFRS) at presentation and on follow-up imaging when patients receive treatment with systemic antifungal therapy and surgical debridement.

Material and methods: This is a retrospective analysis of imaging data from a cohort of patients diagnosed with AIFRS during the second wave of COVID-19 in single tertiary referral hospital in South India between March 2021 and May 2021 (n = 68). Final diagnosis was made using a composite reference standard which included a combination of MRI findings, clinical presentation, nasal endoscopy and intraoperative findings, and laboratory proof of invasive fungal infection. Analysis included 62 patients with "Definite AIFRS" findings on MRI and another six patients with "Possible AIFRS" findings on MRI and laboratory proof of invasive fungal infection. Follow-up imaging was available in 41 patients.

Results: The most frequent MRI finding was T2 hypointensity in the sinonasal mucosa (94%) followed by mucosal necrosis/loss of contrast-enhancement (92.6%). Extrasinosal inflammation with or without necrosis in the pre-antral fat, retroantral fat, pterygopalatine fossa, and masticator space was seen in 91.1% of the cases. Extrasinosal spread was identified on MRI even when the computed tomography (CT) showed intact bone with normal extrasinosal density. Orbital involvement (72%) was in the form of contiguous spread from either the ethmoid or maxillary sinuses; the most frequent presentation being orbital cellulitis and necrosis, with some cases showing extension to the orbital apex (41%) and inflammation of the optic nerve (32%). A total of 22 patients showed involvement of the cavernous sinuses out of which 10 had sinus thrombosis and five patients had cavernous internal carotid artery involvement. Intracranial extension was seen both in the form of contiguous spread to the pachymeninges over the frontal and temporal lobes (25%) and intra-axial involvement in the form of cerebritis, abscesses, and infarcts (8.8%). Areas of blooming on SWI were noted within the areas of cerebritis and infarcts. Perineural spread of inflammation was seen along the mandibular nerves across foramen ovale in five patients and from the cisternal segment of trigeminal nerve to the root exit zone in pons in three patients. During follow-up, patients with disease progression showed involvement of the bones of skull base, osteomyelitis of the palate, alveolar process of maxilla, and zygoma. Persistent hyperenhancement in the post-operative bed after surgical debridement and resection was noted even in patients with stable disease.

Conclusion: Contrast-enhanced MRI must be performed in all patients with suspected AIFRS as non-contrast MRI fails to demonstrate tissue necrosis and CT fails to demonstrate extrasinosal disease across intact bony walls. Orbital apex, pterygopalatine fossa, and the cavernous sinuses form important pathways for disease spread to the skull base and intracranial compartment. While cerebritis, intracranial abscesses, and infarcts can be seen early in the disease due to the angioinvasive nature, perineural spread and skull base infiltration are seen 3-4 weeks after disease onset. Exaggerated soft-tissue enhancement in the post-operative bed after debridement can be a normal finding and must not be interpreted as disease progression.

Keywords: COVID-19, Fungal sinusitis, MRI, Mucormycosis, Rhinosinusitis.

PMID: 37680251

9. Utility of in-house and commercial PCR assay in diagnosis of Covid-19 associated mucormycoss in an emergency setting in a tertiary care center

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J Med Microbiol. 2023 Aug;72(8). doi: 10.1099/jmm.0.001745.

Abstract

Introduction: Invasive mucormycosis (IM) is a potentially fatal infection caused by fungi of the order Mucorales. Histopathology, culture, and radiology are the mainstays of diagnosis, but they are not sufficiently sensitive, resulting in delayed diagnosis and intervention. Recent studies have shown that PCR-based techniques can be a promising way to diagnose IM.

Hypothesis/Gap Statement: Early diagnosis of fungal infections using molecular diagnostic techniques can improve patient outcomes, especially in invasive mucormycosis.

Aim: The aim of this study was to evaluate the utility of our in-house mould-specific real time PCR assay (qPCR) in comparison with the commercially available real time PCR (MucorGenius PCR), for the early diagnosis of mucormycosis in tissue samples from patients with suspicion of invasive mucormycosis (IM). This in-house assay can detect and distinguish three clinically relevant mould species, e.g. *Aspergillus spp*., Mucorales and Fusarium spp. in a single reaction with only one pair of primers, without the need for sequencing.

Methodology: We enrolled 313 tissue samples from 193 patients with suspected IM in this prospective study. All cases were classified using EORTC/MSGERC guidelines. All samples were tested using traditional methods, in-house qPCR, and MucorGenius PCR.

Results: Using direct microscopy as a gold standard, the overall

sensitivity and specificity of in-house qPCR for detection of IM was 92.46% and 80% respectively, while that of the MucorGenius PCR was 66.67% and 90% respectively. However, co-infection of IM and IA adversely affected the performance of MucorGenius PCR in detection of IM. The in-house PCR detected *Aspergillus spp*. in 14 cases and *Fusarium spp*. in 4 cases which showed clinical and radiological features of fungal sinusitis. The in-house qPCR also performed better in detecting possible cases of IM. This aids early diagnosis and appropriate treatment to improve patient outcomes. **Conclusion**: Because the in-house PCR is not only sensitive and specific, but also entirely based on SYBR Green for detection of targets, it is less expensive than probe-based assays and can be used on a regular basis for the diagnosis of IM in resource-constrained settings. It can be used to distinguish between mucormycosis and fungal sinusitis caused by *Aspergillus* and *Fusarium* in high-risk patients, as well as to accurately detect Mucorales in fungal co-infection cases.

Keywords: MucorGenius®PCR, Invasive aspergillosis, Invasive fusariosis, Invasive mucormycosis, Melting curve analysis, Real-time PCR.

PMID: 37624041

10. Magnetic resonance imaging spectrum of COVID-associated rhino-orbital-cerebral mucormycosis and assessment of anatomical severity

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Neuroradiol J. 2023 Aug;36(4):404-413. doi: 10.1177/19714009221114442. Epub 2022 Nov 21.

Abstract

Objectives: To describe the extent and imaging findings of COVID-associated rhino-orbital-cerebral mucormycosis on magnetic resonance imaging and to evaluate the value of MRI severity score in grading the extent of involvement.

Methods: Proven cases of ROCM with a history of concurrent or recently (<6 weeks) treated COVID-19 underwent MRI at the initial presentation. Findings were charted for each anatomical structure and the extent of involvement was scored for sinonasal, extra-sinus soft tissues, orbits, and brain. MR severity score was defined by summing up the individual scores of each compartment (sinonasal 20, orbital 20, soft tissue 10, and brain 10) and a total score out of 60 was assigned.

Results: A total of 47 patients were included in our study with variable involvement of sinonasal compartment (n = 43), extra-sinus soft tissue (n = 25), orbits (n = 23), and brain (n = 17). In the sinonasal compartment, T2, DWI, and post-contrast T1 were the most useful sequences. A significantly higher mean sinonasal score was associated with mortality (p = 0.007). In the orbits, a combination of STIR (orbital fat and extraconal muscles), DWI (optic nerves), and post-contrast images (superior ophthalmic vein) were the most accurate sequences. A higher mean orbital score was associated with vision loss (p = 0.001). Patients with uncontrolled diabetes had greater extent of cranial involvement.

Conclusion: A combination of magnetic resonance sequences is required to correctly evaluate the involvement of individual structures and thus to assign the correct MR scoring. The proposed MR severity score can effectively and objectively evaluate the severity of COVID-associated ROCM.

Keywords: COVID-19, Magnetic resonance imaging, Mucormycosis.

PMID: 36410783

11. Aquaporin 5-in Extracellular Vesicles of Human Vitreous as a Potential Marker for Fungal Endophthalmitis

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Curr Eye Res. 2023 Aug;48(8):750-757. doi: 10.1080/02713683.2023.2200912.

Abstract

Purpose: Extracellular vesicles (EVs) are lipid-bilayered nanoparticles that play an important role in cellular cross-talk, and as received attention for their role as diseases biomarker. Aquaporin-5 (AQP5) is a small integral membrane protein that help in the migration of cells, proliferation, and invasion. However, the association of AQP5 with fungal diseases is still unknown. The aim of this study was to evaluate the expression of AQP5 in EVs (EV-AQP5) extracted from the vitreous of patients with Fungal Endophthalmitis (FE).

Methods: Vitreous fluid was collected from 20 patients clinically suspected as FE, 10 patients from non-infectious conditions, and 10 patients with bacterial endophthalmitis as controls. EVs were isolated from human vitreous and characterized by dynamic light scattering, and scanning electron microscopy. Human Aquaporin-5 levels were evaluated using a commercial ELISA Kit. The Receiver Operating Characteristic (ROC) curves and its significance were correlated with microbiology data.

Results: Isolated EVs size were approx.250-380 nm in diameter. The measured levels of EV-AQP5 resulted significantly higher in FE patients (mean=216±15pg/ml; 95% confidence interval (CI): 182-250) in comparison to controls (mean=130±12pg/ml; 95%CI: 111-166) (p = 0.001). However, AQP5 levels in EVs derived from culture-proven bacteria patients were insignificant compared to controls (mean=169±4 pg/ml; 95%CI: 161-177). ROC curve was used to define the optimal cut-off level of the test at 180 pg/ml with an AUC of 98% (95%CI: 95-100) (p = .03), with a sensitivity of 100% and specificity of 90%. Additionally, the AQP5 level in EVs derived from culture-negative vitreous was above the threshold value (200 ± 10 pg/ml (95%CI: 180-230) in comparison to the control group (p < .001) However, no significant association was found between age or visual acuity and the level of AQP5 in FE.

Conclusion: Our results reveal that the vitreous EV-AQP5 levels can aid in differentiating FE from non-infectious retinal conditions, mainly when the cultures are negative.

Keywords: Aquaporin-5, ROC curve, Extracellular vesicles, Fungal endophthalmitis, Vitreous.

PMID: 37027237

12. Efficacy of generic forms of itraconazole capsule in treating subjects with chronic pulmonary aspergillosis

Inderpaul Singh Sehgal[1], Keshavamurthy Vinay[2], Sahajal Dhooria[1], Valliappan Muthu[1], Kuruswamy Thurai Prasad[1], Ashutosh Nath Aggarwal[1], Arunaloke Chakrabarti[3], Shivaprakash M Rudramurthy[4], Hansraj Choudhary[4], Ritesh Agarwal[1]

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Mycoses. 2023 Jul;66(7):576-584. doi: 10.1111/myc.13583.

Abstract

Background: Itraconazole capsules have variable and unpredictable bioavailability.

Objective: Whether the generic brands are as effective as the innovator itraconazole in treating subjects with chronic pulmonary aspergillosis (CPA) remains unclear.

Methods: In this retrospective study, we treated CPA subjects with 6-month itraconazole capsule and measured itraconazole levels at 2 weeks, 3 months and 6 months. Our primary outcome was to compare the proportion of subjects achieving therapeutic drug levels (≥0.5 mg/L) with the generic and the innovator itraconazole after 2 weeks. We performed a multivariate logistic regression analysis to ascertain whether trough itraconazole levels affected treatment outcomes. We categorised treatment response as favourable or unfavourable based on improvement (or worsening) in clinical symptoms, microbiology and imaging. We also performed morphometric analysis of different brands of itraconazole by video-dermoscopy.

Results: We included 193 (generic brands [n = 94] and innovator itraconazole [n = 99]) CPA subjects. A higher proportion of subjects achieved therapeutic levels at 2 weeks with the innovator than with the generic brands (72/99 [73%] vs. 27/94 [29%], p < .0001). The median trough level at 2 weeks was higher with the innovator than the generic brands (0.8 vs. 0 mg/L). The mean trough itraconazole levels achieved (average of three values measured over 6 months) independently predicted a favourable treatment response after adjusting for age, gender and CPA severity. On morphometric analysis, the generic brands had variable pellet numbers and sizes, and dummy pellets.

Conclusion: At 2 weeks, a significantly higher proportion of CPA subjects achieved therapeutic drug levels with the innovator than the generic itraconazole. The mean serum itraconazole levels independently predicted a favourable treatment response in CPA.

Keywords: CPA, Aspergillosis, Itraconazole, Oral azoles, Simple aspergilloma.

PMID: 36967117

13. Primary odontogenic onset invasive mucormycosis-an under recognized clinical entity

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Clin Microbiol Infect. 2023 Aug;29(8):1086.e1-1086.e5. doi: 10.1016/j.cmi.2023.05.002.

Abstract

Objectives: The primary source of facial mucormycosis is through inhalation of fungal sporangiospores, resulting in invasive disease in paranasal sinuses. However, dental onset mucormycosis has not been well documented in literature. The aim of this study was to describe the clinical characteristics and outcomes of patients with odontogenic onset mucormycosis.

Methods: From a large cohort of mucormycosis involving the face between July 2020 and October 2021, we selected patients who had dental symptoms at onset and predominant alveolar involvement with little to no paranasal sinus disease as shown by baseline imaging. All patients had a confirmed diagnosis of mucormycosis through histopathology, with or without the growth of Mucorales in fungal culture.

Results: Out of 256 patients with invasive mucormycosis of the face, 8.2% (21 patients) had odontogenic onset. Uncontrolled diabetes was a common risk factor, affecting 71.4% (15/21) of the patients, while recent COVID-19 illness was noted in 80.9% (17/21) of patients. The median duration of symptoms at presentation was 37 days (IQR, 14-80 days). The most common symptoms were dental pain with loose teeth (100%), facial swelling (66.7% [14/21]), pus discharge (28.6% [6/21]), and gingival and palatal abscess (28.6% [6/21]). Extensive osteomyelitis was found in 61.9% (13/21) of the patients, and 28.6% (6/21) had oroantral fistulas. The mortality rate was low, at 9.5% (2/21), with only 9.5% (2/21) of the patients having brain extension and 14.2% (3/21) in the orbit.

Conclusion: This study suggests that odontogenic onset invasive mucormycosis may be a separate clinical entity with its own distinct clinical features and prognosis.

Keywords: Dental mucormycosis, Face; Mandibular mucormycosis, Mucormycosis, Odontogenic onset mucormycosis.

PMID: 37179009

14. The Radiological Spectrum of Rhino-Oculo-Cerebral Mucormycosis

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Cureus. 2023 Jun 25;15(6):e40932. doi: 10.7759/cureus.40932.

Abstract

Aim: We aim to study the spectrum of imaging findings in patients with rhino-oculo-cerebral mucormycosis (ROCM).

Materials and methods: This retrospective descriptive study was performed in histopathologically confirmed cases of rhino-oculo-cerebral mucormycosis in a tertiary care center in Bihar, India. The case records of patients with radiological, cultural, and histological evidence of acute invasive ROCM were retrospectively evaluated for relevant radiological and clinical data between May 2021 and June 2022.

Results: The radiological evaluation included computed tomography (CT) and magnetic resonance imaging (MRI) scans done on 52 patients. The patient's average age was 48 years. The ethmoid sinus was involved in 51 (98%) cases and the maxillary sinus in 50 (96%) cases. Bilateral sinus involvement (45, 86%) was the most common, followed by pansinus involvement (27, 52%). The orbit was involved in 39 (75%) cases, the face in 25 (47%) cases, and retroantral fat stranding in 24 (46%) cases. Mucosal thickening (91%) was the most common pattern of involvement, followed by complete opacification (77%). Osseous involvement was seen in 17 of 44 patients who had CT scans, and the majority of patients had extrasinus extension with intact bone. MRI revealed variable T2SI, with T2 hyperintensity being the most common pattern. Heterogeneous enhancement in post-contrast imaging was the most common.

Conclusion: ROCM is a life-threatening invasive fungal infection, especially in an immunocompromised state. ROCM is characterized by a variety of imaging abnormalities on CT and MRI, although nonspecific. Imaging aids in suspicion or early diagnosis in appropriate clinical contexts, particularly in an immunocompromised state, and in determining the degree of involvement and complications. Early detection of ROCM and its complications enables proper treatment,

which can lower the cost of care, morbidity, and mortality.

Keywords: Fungal, Mucormycosis infection, Paranasal sinus, Radiological spectrum, Rhino-oculo-cerebral mucormycosis, ROCM.

PMID: 37519552

15. *Scedosporium* Infection in Recipients of Kidney Transplants from Deceased Near-Drowning Donor

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Emerg Infect Dis. 2023 Nov;29(11):2406-2408. doi: 10.3201/eid2911.231000.

Abstract

Scedosporium aurianticum infection developed in 2 recipients of kidney transplants in India, acquired from the same deceased near-drowning donor. Given the substantial risk for death associated with *Scedosporium* infection among solid-organ transplant recipients, safety protocols for organ transplantation from nearly drowned donors should be thoroughly revaluated and refined.

Keywords: India, *Scedosporium aurianticum*, Donor-derived fungal infection, Fungi, Kidney transplant recipients, Near-drowning organ donor, Pneumonia, Respiratory infections, Voriconazole.

PMID: 37877682

16. Cytology of *Rhytidhysteron rufulum*: An emerging cause of phaeohyphomycosis

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Diagn Cytopathol. 2023 Dec;51(12):E338-E341. doi: 10.1002/dc.25216.

Abstract:

Fine-needle aspiration cytology (FNAC) is often the first-line investigation for detection of any fungal infection. *Rhytidhysteron rufulum* is an emerging dematiaceous fungus detected as a human pathogen. FNAC combined with molecular techniques helps in the detection of rare fungal species, especially in cases of non-sporulating fungi. We describe the cytomorphologic features of this species in a 62-year immunocompetent male who presented with a localised subcutaneous infection. Molecular studies helped in the final diagnosis.

Keywords: *Rhytidhysteron rufulum,* Cytology, Molecular methods, Phaeohyphomycosis.

PMID: 37602913

17. Tc-99 m Ubiquicidin Imaging in Orbital *Aspergilloma*: an Illustration

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Nucl Med Mol Imaging. 2023 Jun;57(3):162-163. doi: 10.1007/s13139-022-00784-0.

Abstract

Aspergillus infection is relatively rare disease, and we present a case of orbital aspergillus infection who presented with right orbital pain and swelling. Right orbital lesion was identified on CT, MRI, and PET-CT imaging followed by confirmation of *aspergillus* on histopathological examination. We demonstrate that Tc-99 m ubiquicidin scan can yield positive results in aspergillosis too, enabling its differentiation from non-infective pathologies.

Keywords: Fungal infection, Orbital aspergillosis, Tc-99 m ubiquicidin.

PMID: 37187954

18. The hidden world of fish fungal pathogens: molecular identification and phylogenetic analysis in common carp, *Cyprinus carpio*

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Arch Microbiol. 2023 Aug 20;205(9):311. doi: 10.1007/s00203-023-03651-4.

Abstract

Fungal infections pose a significant threat to aquaculture, causing substantial economic losses and ecological disruptions. The common carp (*Cyprinus carpio*), as a crucial farmed fish, requires in-depth research to uncover the underlying fungal pathogens affecting its health. In this study, we analyzed 150 samples of *C. carpio* to identify the fungal pathogens responsible for the infections based on clinical signs and symptoms. Further, we assessed fungal diversity and prevalence in the infected fish. The infected fish exhibited varying degrees of gross pathogenicity, with fins and skin heavily affected, intermediate infection observed in the head and gills, and the least infection found in the operculum. Morphological examination revealed distinct characteristics such as necrosis, lesions on the skin, fins, and gills, as well as loss of scales, hemorrhagic lesions, and red spots. Furthermore, the presence of gray and white cottony patches on the body confirmed ascomycete and zygomycete infections, while a dark white cottony mass indicated phycomycete infection. Some fish exhibited severe fungal infections, presenting prominently curved spines and necrosis with red spots on the skin. These isolates belonged to various fungal groups, including ascomycetes,

zygomycetes, phycomycetes, deuteromycetes, and basidiomycetes. Among these, *Fusarium oxysporum* emerged as the most prevalent fungal pathogen, followed by *Fusarium solani*, *Saprolegnia delica,* and *Saprolegnia parasitica*. Molecular identification based on ITS and LSU rRNA sequences confirmed the presence of *Saprolegnia delica, Mucor hiemalis, Coniothyrium telephii, Rhodotorula mucilaginosa, Penicillium cellarum,* and *Fusarium californicum* in the fish samples. Phylogenetic analysis further supported the morphological and molecular data, providing insights into the relationship between the isolated fungal strains and known species from various geographical regions. Our study enhances our understanding of the diversity and prevalence of fish fungal pathogens in common carp, emphasizing the significance of employing molecular techniques for accurate identification. These comprehensive findings offer essential insights into the impact of fungal infections on common carp populations, laying the groundwork for targeted control measures to mitigate their effects on global aquaculture.

Keywords: Aquaculture, *Cyprinus carpio*, Fish fungal pathogens, Fungal diversity, Molecular identification, Phylogenetic analysis.

PMID: 37598385

19. *Candida auris* in Dog Ears

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J Fungi (Basel). 2023 Jun 30;9(7):720. doi: 10.3390/jof9070720.

Abstract

Candida auris is an emerging global public health threat and is resistant to most antifungal agents. Though fungi are significant pathogens for animals, the role of *C. auris* in animal health remains unexplored. Here, we analysed the microbial cultures of skin and ear swabs of 87 dogs in Delhi and performed fungal meta-barcode sequencing of ear and skin samples of 7 dogs with confirmed otitis externa (OE). Overall, 4.5% of dogs (4/87) with chronic skin infections contained evidence of *C. auris* in their ear canal (n = 3) and on their skin surface (n = 1). Of the three OE dogs with *C. auris* infection/colonisation, a diversity of fungi was observed, and their meta-barcode ITS sequence reads for *C. auris* ranged from 0.06% to 0.67%. Whole-genome sequencing of six *C. auris* strains obtained in culture from two dogs showed relatedness with Clade I clinical strains. The report highlights the isolation of *C. auris* from an animal source; however, the routes of transmission of this yeast to dogs and the clinical significance of transmission between dogs and humans remain to be investigated.

Keywords: *Candida auris*, ITS, Dogs, Meta-barcode sequencing, Otitis externa, Whole-genome sequencing.

PMID: 37504709

20. Mucocutaneous manifestations of COVID-19-associated mucormycosis: A retrospective cross-sectional study

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Indian J Dermatol Venereol Leprol. 2023 Jul-Aug;89(4):510-523. doi: 10.25259/IJDVL_277_2022.

Abstract

Background Cutaneous mucormycosis has shown a significant upsurge during the COVID-19 pandemic. Due to the rapid progression and high mortality of cutaneous mucormycosis in this context, it is important to identify it early. However, very few studies report detailed clinical descriptions of cutaneous mucormycosis in COVID-19 patients. Objectives To describe mucocutaneous lesions of COVID-19-associated mucormycosis based on clinical morphology and attempt to correlate them with radiological changes. Methods A retrospective cross-sectional study was conducted at a tertiary care centre from 1st April to 31st July 2021. Eligibility criteria included hospitalised adult patients of COVID-19-associated mucormycosis with mucocutaneous lesions. Results All subjects were recently recovering COVID-19 patients diagnosed with cutaneous mucormycosis. One of fifty-three (2%) patients had primary cutaneous mucormycosis, and all of the rest had secondary cutaneous mucormycosis. Secondary cutaneous mucormycosis lesions presented as cutaneous-abscess in 25/52 (48%), nodulo-pustular lesions in 1/52 (2%), necrotic eschar in 1/52 (2%) and ulcero-necrotic in 1/52 (2%). Mucosal lesions were of three broad sub-types: ulcero-necrotic in 1/52 (2%), pustular in 2/52 (4%) and plaques in 1/52 (2%). Twenty out of fifty-two patients (38%) presented with simultaneous mucosal and cutaneous lesions belonging to the above categories. Magnetic resonance imaging of the face showed variable features of cutaneous and subcutaneous tissue involvement, viz. peripherally enhancing collection in the abscess group, "dot in circle sign" and heterogeneous contrast enhancement in the nodulo-pustular group; and fat stranding with infiltration of subcutaneous tissue in cases with necrotic eschar and ulcero-necrotic lesions. Limitations The morphological variety of cutaneous mucormycosis patients in a single-centre study like ours might not be very precise. Thus, there is a need to conduct multi-centric prospective studies with larger sample sizes in the future to substantiate our morphological and radiological findings. Conclusions COVID-19-associated mucormycosis patients in our study presented with a few specific types of mucocutaneous manifestations, with distinct magnetic resonance imaging findings. If corroborated by larger studies, these observations would be helpful

in the early diagnosis of this serious illness.

Keywords: COVID-19-associated mucormycosis, Cutaneous mucormycosis.

PMID: 36688884

21. Knowledge, attitude, and practice toward mucormycosis among patients discharged from a COVID-19 care tertiary center in South India: A questionnaire-based survey

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Indian J Ophthalmol. 2023 Jul;71(7):2818-2821. doi: 10.4103/IJO.IJO_131_23.

Abstract

Purpose: To study the awareness of mucormycosis among discharged inpatients after receiving treatment for COVID-19 infection at a tertiary COVID care center in south India.

Methods: This was a telephone-based survey conducted using a questionnaire consisting of 38 questions in five sections in the month of June-July 2021. COVID-positive inpatients who had been admitted, treated, and discharged from a government medical college were contacted via phones, and their responses were directly entered into the Google Forms platform.

Results: A total of 222 participants were included in the study. Among all the participants, a cumulative 66% of participants had some knowledge of mucormycosis and 98/222 (44%) did not have any idea of mucormycosis in spite of being admitted to the hospital. More than 40% of them reported that their prime source of information was through mass communication. Around 81% of the respondents were aware that it can occur after COVID-19 infection. Among them, only 25 knew that systemic steroids were the main risk factor. Sixty-four out of 124 knew that diabetes is a major risk factor. Fifty percent agreed that a vaccine for COVID can prevent mucormycosis.

Conclusion: Such knowledge, attitude, and practice (KAP) studies give us an idea of the impact of the measures taken for educating the public. In this study, a cumulative 66% of participants had some knowledge of mucormycosis and 34.7% were diabetics who had better knowledge and practice scores than non-diabetics. Sixty-six point nine percent felt that it was possible to prevent this condition.

Keywords: COVID recovered, KAP, Inpatients, Mucormycosis.

PMID: 37417127

22. Frontal osteomyelitis post-COVID-19 associated mucormycosis

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Indian J Ophthalmol. 2023 Jul;71(7):2906-2910. doi: 10.4103/IJO.IJO_3117_22.

Abstract

Rhino-orbito-cerebral mucormycosis (ROCM) is the most commonly noted form of mucormycosis, which is the most common secondary fungal infection following severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Osteomyelitis is one of the rare sequelae of ROCM, frontal osteomyelitis being the rarest. We present four patients of coronavirus disease 2019 (COVID-19)-associated mucormycosis, who presented with frontal bone osteomyelitis after being treated for ROCM surgically and medically. This is the first case series highlighting this complication in post-COVID-19 mucormycosis patients and needs utmost attention as it can be life-threatening and can cause extreme facial disfiguration. All four patients are alive with salvage of the affected globe and vision being preserved in one patient. If identified early, disfiguration of face and intracranial extension can be avoided.

Keywords: Frontal bone osteomyelitis, Pott's puffy tumor, Fungal orbital and sinus infections, Mucormycosis, Post–COVID-19 mucormycosis.

PMID: 37417145

23. Non-COVID-19 Cutaneous Mucormycosis from a Plastic Surgical Perspective

Vimalendu Brajesh[1], Sneha Sharma[1], Aditya Aggarwal[1], Sukhdeep Singh[1], Sanjay Mahendru[1], Hardeep Singh[1], Ankit Jain[1], Rahul Jain[1], Rakesh Kumar Khazanchi[1]

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Indian J Plast Surg. 2023 Jul 28;56(4):350-356. doi: 10.1055/s-0043-1771294.

Abstract

Background Cutaneous mucormycosis is a rare and fulminant infection associated with high mortality. Plastic surgeons come across this infection in the settings of road traffic accidents, surgical site infections, and as a secondary infection with underlying bacterial soft tissue infections. Due to this infection's rarity and aggressive course, it is essential to initiate prompt multidisciplinary management at the first presentation. With this study, we aim to present a protocol for managing the condition. Methods This is a retrospective observational study of patients with cutaneous mucormycosis managed at a tertiary care hospital from January 1, 2016 to November 30, 2022 excluding patients with mucormycosis who tested positive for coronavirus disease 2019. Results Of 24 patients, 22 were males, and most were in the age group of 41 to 60 years. Sixteen patients survived and five out of eight deceased had comorbidities, six presented primarily without prior debridement, and six had trunk involvement. Conclusion A high index of clinical suspicion is necessary for early diagnosis and management of patients with invasive cutaneous mucormycosis. A multidisciplinary approach with appropriate medical and surgical management can improve outcomes in cases that otherwise carry a high mortality rate.

Keywords: cutaneous mucormycosis, Fungal infection, Invasive cutaneous mucormycosis, Mucormycosis.

PMID: 37705818

24. Comparative evaluation of histopathological analysis, KOH wet mount and fungal culture to diagnose fungal infections in post-COVID patients

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Indian J Pathol Microbiol. 2023 Jul-Sep;66(3):540-544. doi: 10.4103/ijpm.ijpm_663_21.

Abstract

Context and aim: There is increasing prevalence of post-COVID fungal infection of rhinoorbitocerebral region especially mucormycosis and aspergillosis in India.[1] Early diagnosis of these fungal infections are of utmost importance, since it may improve outcome and survival.[2],[3],[4],[5],[6],[7],[8] The objective of this study was to evaluate and compare routine laboratory diagnostic methods, that is, histopathological examination, KOH wet mount and fungal culture in the diagnosis of post-COVID fungal infections.

Materials and methods: A total of 106 specimens of clinically suspected patients of post-COVID fungal infection of rhinoorbitocerebral region received in histopathology department were included in this study. The data of KOH wet mount and culture were acquired from the microbiology department after histopathological examination.

Result: Approximately 88.68% of patients were diagnosed having fungal infections by one of the laboratory methods. The sensitivity of histopathological examination was highest (79.78%), followed by KOH wet mount (58.51%) and fungal culture (35.10%). Rhizopus species of zygomycetes group were the most common isolate (24.24%) on SDA culture. Overall 76% concordance was found between histopathological examination and fungal culture report for morphological identification of fungi.

Conclusion: For the diagnosis of post-COVID fungal infection of Rhino-orbito-cerebral region, histopathological examination is was found to be more sensitive and rapid method to detect fungal hyphae. It leads to early treatment, prevents morbidity and mortality.

Keywords: Aspergillosis, KOH wet mount, Culture, Fungal infections, Histopathology, Mucormycosis, Post COVI, Rhino-orbito-cerebral infection.

PMID: 37530335

25. Coccidioidomycosis lymphadenopathy: an unusual presentation

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BMJ Case Rep. 2023 Jul 18;16(7):e253740. doi: 10.1136/bcr-2022-253740.

Abstract

Coccidioidomycosis is known to occur around the western hemisphere. In tropical countries, the clinical presentation is atypical presenting with a superficial abscess preceded by respiratory tract involvement often mimicking tuberculosis. Eliciting a history of exposure and high suspicion is imperative for early diagnosis. In the present case report, a man in his early 30s presented with complaints of swelling over the neck for the past 2 months with a recent travel history. With a provisional clinical diagnosis of tuberculosis, a biopsy of the swelling revealed features of granulomas with non-caseating necrosis with Coccidioidomycosis organisms demonstrated by fungal stains. Fungal culture and serology reiterated Coccidioides and he recovered after a course of fluconazole. The case report concludes with a statement that Coccidioidomycosis is known to manifest with lymphadenitis mimicking tuberculosis and must be taken into account as one of the differentials. The current report is presented for its rarity in India with atypical presentation.

Keywords: Infections, Infectious diseases.

PMID: 37463776

26. Cryptococcosis among HIV negative liver disease patients: Epidemiology, underlying conditions, antifungal susceptibility profile from tertiary care hepatobiliary center

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Indian J Med Microbiol. ۲۰۲۳ Nov-Dec:46:100465. doi: 10.1016/j.ijmmb.2023.100465.

Abstract

Purpose: Cryptococcus neoformans is an encapsulated yeast. It is a significant pathogen among immunocompromised people with HIV & Non-HIV vulnerable populations. These conditions include cancer, corticosteroid usage, immunosuppression following sarcoidosis, organ transplantation, immunosuppressive medication, and liver cirrhosis. In cirrhotic, it accounts for %21-6 of systemic infections.

Methods: The retrospective study was conducted in tertiary care hepatobiliary center in New Delhi, India. Samples of blood, cerebrospinal fluid (CSF), urine, body fluids, and serum were processed for gram stain, India ink, fungal culture and identification, and cryptococcal antigen. Antifungal susceptibility was assessed using the micro-broth dilution technique.

Results: 30 patients with cryptococcal infection were analysed, and 40 isolates from various samples were recovered. Out of 40 samples, C. neoformans was isolated from blood (%62.5), urine (%15), ascitic fluid (%10), MiniBAL (%5), bone marrow, CSF, and pleural fluid in one sample each. India ink positivity was %56 and all samples were positive for Cryptococcal antigen. Alcoholic liver disease & Hepatitis B & C associated chronic liver disease were seen in %20 & %43 of patients. Other underlying conditions were diabetes mellitus (%20), TB (%10), autoimmune hepatitis (%6.6), autoimmune disease (autoimmune hemolytic anemia, Sjogren syndrome) (%6.6), sarcoidosis (%3.3), hepatocellular carcinoma (,%2.5 ,%5 ,%7.5 .(%3.3 %7.5, and %2.5 of C. neoformans strains were the non-wild type to fluconazole, -5fluorocytosine, amphotericin B, posaconazole, and itraconazole respectively, but all strains were wildtype to voriconazole.

Conclusion: According to the study liver conditions are a significant risk factor for cryptococcal infection. Therefore, cryptococcal isolation and antifungal susceptibility testing, as well as appropriate antifungal drug use, should be studied and paid attention too.

Keywords: Antifungal susceptibility, Cirrhosis, Cryptococcal infection, Liver disease, Non-HIV.

PMID: 37690316

27. Clinicopathological correlation of oral candidiasis - Our experience in a tertiary centre over two decades

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Malays J Pathol. 2023 Aug;45(2):237-246.

Abstract

Introduction: Oral candidiasis is one of the most common fungal infections that has been widely reported around the world. In Malaysia, the available studies for this infection are scarce.

Materials and methods: This is a 20-year retrospective study aimed to investigate the prevalence, demographic characteristics, clinical presentations, and the association of oral candidiasis with clinical parameters in oral candidiasis cases reported in the Faculty of Dentistry, Universiti Malaya from 1999 until 2019. A total of 12,964 histopathological records from the Oral Pathology Diagnostic and Research Laboratory (OPDRL) between 1999 to 2019 were retrieved. Oral candidiasis cases were selected according to the inclusion and exclusion criteria. Information of interest was obtained and analysed.

Results: From the total records retrieved, 378 oral candidiasis cases were recorded and 82.8% were diagnosed from smear test. This study showed that oral candidiasis was predominantly reported in female (64.2%) and Indian population (64.2%). The peak incidence was in the sixth decades of life (27.0%). The most commonly affected site was tongue and coated tongue was the most common clinical presentation. More than 50% of the cases had comorbidity and 10.6% were associated with dentures. Ethnicity and site of occurrence were significantly associated ($p<0.05$) with oral candidiasis.

Conclusion: This is the first large-scale study of oral candidiasis cases in Malaysia. The findings of this study are useful for clinical assessment of patients suspected of oral candidiasis.

Keywords: Oral candidiasis, Demographic characteristics, retrospective.

PMID: 37658533

28. **Satellite Epidemic of Covid-19 Associated Mucormycosis in India: A Multi-Site Observational Study**

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Mycopathologia. 2023 Oct;188(5):745-753. doi: 10.1007/s11046-023-00770-w. Epub 2023 Jul 25.

Abstract

Background: Sudden upsurge in cases of COVID-19 Associated Mucormycosis (CAM) following the second wave of the COVID-19 pandemic was recorded in India. This study describes the clinical characteristics, management and outcomes of CAM cases, and factors associated with mortality.

Methods: Microbiologically confirmed CAM cases were enrolled from April 2021 to September 2021 from ten diverse geographical locations in India. Data were collected using a structured questionnaire and entered into a web portal designed specifically for this investigation. Bivariate analyses and logistic regression were conducted using R version 4.0.2.

Results: A total of 336 CAM patients were enrolled; the majority were male (n = 232, 69.1%), literate (n = 261, 77.7%), and employed (n = 224, 66.7%). The commonest presenting symptoms in our cohort of patients were oro-facial and ophthalmological in nature. The median (Interquartile Range; IQR) interval between COVID diagnosis and admission due to mucormycosis was 31 (18, 47) days, whereas the median duration of symptoms of CAM before hospitalization was 10 (5, 20) days. All CAM cases received antifungal treatment, and debridement (either surgical or endoscopic or both) was carried out in the majority of them (326, 97.02%). Twenty-three (6.9%) of the enrolled CAM cases expired. The odds of death in CAM patients increased with an increase in HbA1c level (aOR: 1.34, 95%CI: 1.05, 1.72) following adjustment for age, gender, education and employment status.

Conclusion: A longer vigil of around 4-6 weeks post-COVID-19 diagnosis is suggested for earlier diagnosis of CAM. Better glycemic control may avert mortality in admitted CAM cases.

Keywords: Diabetes mellitus, Fungal infection, Mortality, Pandemic, SARS-CoV 2, Second wave.

PMID: 37490256

Announcements

Announcements

Are you worried to isolate or identify *Candida auris* in your hospital and you don't have MALDI-TOF, VITEK or DNA sequencing facility? PGI Chandigarh offered a simple solution.

Dr. Anup Ghosh and his team designed a very simple medium and named selective auris medium or SAM which is published recently in Journal of Clinical Microbiology.

Sourav Das, Shreya Singh, Yamini Tawde, Arunaloke Chakrabarti, Shivaprakash M Rudramurthy, Harsimran Kaur, Shamanth A Shankarnarayan and Anup Ghosh*. A Selective Medium for Isolation and Detection of *Candida auris,* an Emerging Pathogen. J Clin Microbiol. 2021 Jan 21;59(2):e00326-20.

Candida auris is a multidrug resistant yeast that possess serious threat to public health and hits the critical priority group in the latest

WHO fungal priority pathogen list. Identification of this pathogen is challenging because conventional phenotypic/biochemical tests used in routine practice fails to detect this pathogen. Sequencing and MALDI-TOF (with updated database) based detection are the only ways to identify this yeast but availability of both these techniques is limited in many peripheral routine diagnostic laboratories, necessitating the development of a cost-effective, rapid, and reliable method of identification. After testing various combinations, we successfully developed a medium [Selective Auris Medium (SAM)] comprising of YPD agar supplemented with sodium chloride (12.5%) and ferrous sulphate (9mM) that selectively allowed the growth of *C. auris* after incubation at 42°C for 48 h. 579 yeast isolates and 40 signal-positive Bactec. blood culture (BC) broths were used for validation. A total of 95% (127/133) of C. auris isolates tested grew on the standardized media within 48 h, and the remaining 6 isolates grew after 72 h, whereas all non-C. auris isolates were completely inhibited. The specificity, sensitivity, positive and negative predictive values of the test medium were all 100% after 72 h of incubation. The formulated selective medium can be reliably used for the detection and identification of *C. auris*. The SAM is inexpensive (approx. 25 INR or 0.5 $ per plate), can easily be prepared, and can be used as an alternative to molecular diagnostic tools in the clinical microbiology laboratories in the resource limited settings.

Article link: DOI: https://doi.org/10.1128/jcm.00326-20

Glimpse of CME on Fungal Infections

Glimpse of CME on Fungal Infections

A one-day CME on Fungal infections on theme "Demystifying Fungal Infections" was held on 27th August 2023 at Delhi under the aegis of ISMM (Indian society of medical mycologists) in collaboration with CIDS (Clinical Infectious Disease society) Haryana, Noida, Chandigarh Tricity chapter. For the first time, Infectious disease physician and Mycologists gathered together at one platform to provide an academic feast on Fungal Infections. Renowned national faculty from various medical specialties such as microbiologists, infectious diseases specialists, physicians, intensivists, and pulmonologists were the key speakers and equally accomplished faculty were invited as chairpersons. Overall CME sessions were mix of emerging fungal threat, diagnostics, clinical case discussion with some new concepts on mycobiome, fungal one health and antifungal stewardship More than 200 delegates were registered for the CME. The CME is being accredited with 6 credit hours by Delhi Medical Council.

The programme was kicked off by the welcome address by Dr. Immaculata Xess.

Dr Arunaloke Chakrabarti was the patron of the CME, Dr Randeep Guleria and Dr BL Sherwal were invited as Chief Guest. The inauguration ceremony began with watering of plant by Patron, Chief Guest and organizing Committee. Dr Chakrabarti appreciated this fusion of two different societies, coming together of mycologist and Infectious disease specialists on one common platform for discussions on fungal infections. Same was appreciated and applauded by the Chief Guests. Dr Girish Tyagi, Secretary of Delhi Medical Council was the special invitee, he talked on the Medical Ethics which in the need of hour.

DR Arunaloke Chakrabarti delivered his key note on Global impact and rising threat of fungal infections. This was seconded by Dr Anuj Sharma' s talk on WHO priority fungal pathogens who highlighted the importance and categories of fungal pathogen in the near future. Subsequently, Dr. Shivaprakash Rudramurthy discussed about the current scenario of Antifungal resistance in yeast and Molds.

New concepts on Fungal mycobiome and its role in host pathogen interaction was well addressed by Dr Pratibha Kale and Fungal one health was another noteworthy lecture by Dr Harsimran Kaur.

There were engrossing talks on the diagnostic and clinical utility of fungal biomarkers- Beta D glucan for screening of IFI, Update on Histoplasma biomarkers by Infectious disease specialists Dr Anvita Aggarwal & Dr Ankita Baidya respectively. Continuing with diagnostics, microbiologist Dr Debkishore Gupta talked on Fungal isolation and identification. There was an illuminating session on Multiplexing and genomics on fungal infections by scientist Dr. Gunisha Pasricha. She detailed about the currently available tools in

genomics and metagenomics for fungal infections.

There was a brain storming panel discussions by Infectious disease specialist Dr Chhavi Gupta and Dr Vikas Deswal alogwith esteemed panellists who were experts in Infectious disease, critical care, pulmonary medicine, internal medicine and microbiology. Real world case scenarios were simulated for discussion. Dr. Chhavi Gupta highlighted the importance of early antifungal therapy for invasive candidiasis in critically ill patients and stressed upon the need and approaches for early descalation, while Dr. Vikas Deswal took the concept of dual antifungal therapy in Invasive Mucormycosis and Invasive Aspergillosis. Both the panel discussion ignited thoughts for appropriate usage of antifungals amongst delegates.

Dr Irfana ID specialist discussed the strategies for Antifungal stewardship. Dr Aakashneel Bhattacharya took a rapid-fire session on Practice changing updates in Fungal management where he presented few new developments in fungal management.

There was e poster session by resident doctors across Delhi/NCR and Chandigarh. Poster presentations by participants. A total of 16 posters were submitted. Dr Jagdish Chander and Dr Soumyadip Chatterjee were the judges. Dr Dhouli Jha , Junior resident Department of medicine, AIIMS, New Delhi won the first prize for best poster, she presented "A prospective longitudinal study of chronic pulmonary aspergillosis in newly diagnosed pulmonary tuberculosis patients from diagnosis till end-of-treatment", while the second prize was secured by Dr. Krishna Singha, Junior resident Microbiology from UCMS, Delhi for the poster "Mycological profile of Rhino-Orbito-Cerebral Mucormycosis cases following conversion of a COVID dedicated tertiary care centre to a non-COVID one". A fatal case of cerebral phaeohyphomycosis due to Curvularia hawaiiensis "was the best case report presented by Hassen Ahmed, Department of Microbiology, PGIMER, Chandigarh.

CME was concluded by Vote of Thanks by Dr. Shukla Das.

Preconference CME cum workshop at Microcon 2023, Lucknow

Preconference CME cum workshop at KGMU, Lucknow

Under aegis of IAMM, Microcon 2023, organised a Preconference CME cum workshop at KGMU, Lukhnow on 22 November 2023 by Dr Malini R Capoor, VMMC and Safdarjung Hospital "Combating fungal infections: laboratory diagnosis by conventional , molecular methods and antifungal susceptibility testing. It had national faculty and an international Guest lecture by Dr Erta Kalanxi, One Health Trust on One Health Approach in surveillance in fungal disease and antifungal resistance. It was attended by 62 delegates from various Indian states.

Awards bagged by ISMM members at Microcon 2023, Lucknow

Awards bagged by ISMM members at Microcon 2023, Lucknow, November 23-26th, 2023

1. Pankaj Lakshmi Venugopal award in Mycology to S. Bavadharani from Sriramachandra Medical college, Chennai
2. First prize in oral presentation in the Mycology /Parasitology session to Mrs Karthika K from Sriramachandra Medical college, Chennai
3. Third prize in oral presentation in the Mycology/Parasitology session to Ms. Agimanailiu Khapuinamai from L V Prasad Eye Institute, Hyderabad


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CONFERENCE DATES
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