International Journal of Basic and Applied Sciences, 4 (4) (2015) 371-374
www.sciencepubco.com/index.php/IJBAS
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doi: 10.14419/ijbas.v4i4.5004
Research Paper

Zygomycoses - urgency in diagnosis

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Abstract

Introduction: Zygomycoses is an angioinvasive infection most commonly seen in immunocompromised and diabetic patients. We undertook this study to determine the prevalence of Zygomycoses, in patients with a suspected Invasive Zygomycoses Infection in a tertiary centre and to identify the most common species isolated from culture.
Materials and Methods: A retrospective analysis was done from January 1, 2012 to December 8, 2014; the clinical data of the suspected patients and the positive cultures were collected.
Results and Discussion: A total of 50 samples of 27 patients with suspected Zygomycoses were sent during the 3 year period. In 25 of these patients, the samples sent were tissue biopsies from nasal cavity and 2 wound swabs from burns. Of these, 18 tissue biopsies of 13 patients and two wound swabs were detected positive for Zygomycetes. (2-Absidia corymbifera; 1-Rhizopus, 15-Mucor). Of the remaining 12 patients whose cultures were negative, 1–bacterial 1–bacterial sinusitis, 5-Invasive aspergillosis; 6-treated as Invasive fungal infections due to Zygomycetes as the imaging diagnostics and histopathological features favored that diagnosis. The majority of the patients (80%) were diabetic, and the two from the burn unit were under long-term treatment for chronic wound infections. Multiple diagnostic modalities must be used in view of the aggressive nature of the disease, but microbiological diagnosis remains the Gold Standard.

Keywords: *Zygomycoses; Diabetic Patients; Diagnostic Urgency.*

1. Introduction

Zygomycosis is emerging as an increasing concern over the past two decades [1-5]. It was first reported as a cause of human disease by Paltauf in 1885 [6]. Other filamentous fungi infect hosts with marked immunodeficiency, but Zygomycosis is unique in that it infects a wider group of individuals, including fully immunocompetent hosts [7-8]. Other conditions associated with Zygomycoses are burns, leukemia, lymphoma [9-10], and the use of certain drugs like deferrioxamine [11]. Zygomycetes are divided into two groups- Entomophthorales and Mucorales. Entomophthorales are associated with chronic, indolent infections while Mucorales are aggressive and life-threatening [5]. The major clinical syndromes include rhino cerebral which is the most aggressive and fatal form, as well as other syndromes such as pulmonary, gastrointestinal, cutaneous and renal. Early diagnosis and prompt treatment are essential. The recommended treatment strategy includes conservative treatment with intravenous amphotericin B and radical surgery [12]. Amphotericin B is the only drug with proven efficacy against Zygomycetes. The first-line drug commonly used in suspected invasive fungal infections, i.e. voriconazole is ineffective. This contributes to the high fatality rate of the infection. The prognosis of mucormycosis is poor, with reported mortality rates varying between 45% and 64%, depending on underlying disease [13-15]. Due to the rarity of the disease, studies are few and consist predominantly of case reports even though Zygomycoses is a rising threat and a challenge in treatment. In view of this, we have decided to conduct this study.

2. Aims and obectives

To determine the prevalence of Zygomycoses, in patients with a suspected Invasive Zygomycoses Infection, in a tertiary centre over a 3-year period and to identify the most common species isolated from culture.

3. Materials and methods

A retrospective analysis was conducted for January 2012 to December 2014; the significant clinical data of the suspected patients was collected. The samples were processed; direct microscopy was done with 40%KOH and cultures were put up on Sabouraud's dextrose agar and Potato dextrose agar. The positive cultures were further identified morphologically by Lactophenol Cotton Blue mount.

4. Results and discussion

A total of 50 samples of 27 patients suspected to be suffering from Zygomycoses were sent during the three year period to the clinical microbiology lab for processing. In 25 of these patients, the samples sent were tissue biopsies from the nasal cavity, and 2 were wound swabs from burns. Eighteen tissue biopsies of 13 patients and the two wound swabs were detected positive for Zygomycetes. (2- Absidia corymbifera, 1-Rhizopus spp. and 15-Mucor spp). Of the remaining 12 patients whose samples tested negative for direct microscopy and culture, one was later diagnosed as bacterial sinusitis, five were Invasive Aspergillosis but the other 6 were treated as Invasive fungal infections due to Zygomycetes as the imaging diagnostics and histopathological features favoured that diagnosis. The majority of the patients were diabetic (80%) and the two from the burn unit were under long term treatment with antibiotics for chronic wound infections due to burns.

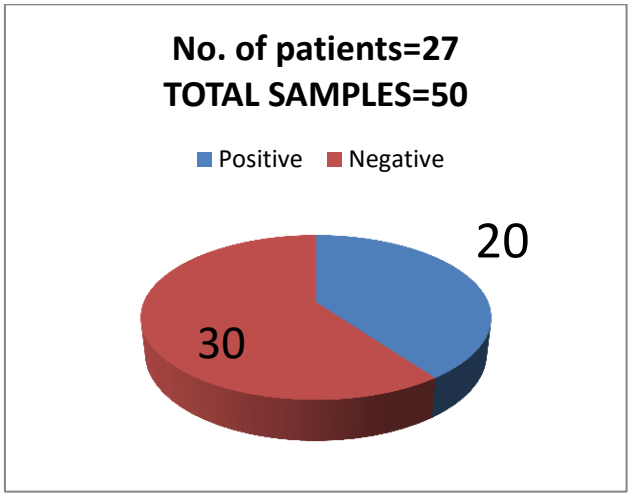


Fig. 1

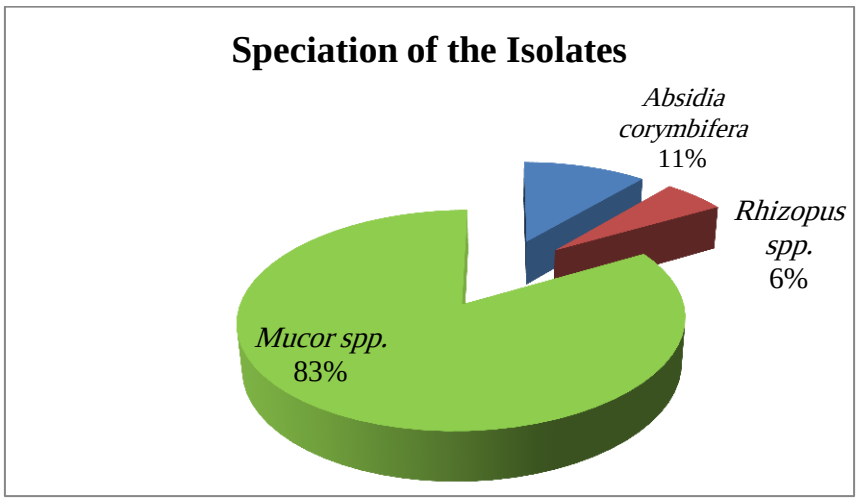


Fig. 2

4.1. Analysis

4.1.1. Underlying conditions

Zygomycoses is unique in its ability to infect immunocompetent hosts. In our study, 12 patients (80%) of those diagnosed to have Zygomycoses had a history of long standing and poorly controlled diabetes. Two patients who were diagnosed with Mucor spp. infections had chronic wound infections due to burns (13.3%). Malignancies are also an important association and studies have found that haematological malignancies form the bulk of this. Our study did not have any patient that had an underlying malignancy. Voriconazole is the mainstay of antifungal prophylaxis in our centre.

4.1.2. Site and pattern of illness

Among the 18 positive samples, 16 were cases of Rhinocerebral Zygomycoses, and two were cutaneous. The paranasal sinuses were the main site of infection. The remaining two were from chronic wound infection due to burns.

4.1.3. Treatment

The patients were treated aggressively with intravenous amphotericin B and surgical debridement of devitalized tissue. The treatments were initiated based on the initial direct microscopy of the biopsy sample (40% KOH) and other radiological findings of extensive tissue destruction. For 6 of the patients, even though the direct microscopy was negative the treatment was started based on clinical and radiological findings.

4.1.4. Outcome

There was two fatalities due to Zygomycoses in this period (10%). The remaining patients responded to the aggressive therapy.

4.2. Discussion

Zygomycoses is unique among filamentous fungi in its ability to cause life threatening, invasive infections in immunocompetent individuals or hosts with marginal immunodeficiency. Among the diagnosed patients, 12 patients had long standing diabetes with no other comorbidities (80%). Rhinocerebral Zygomycoses was the major pattern of infection in these patients. Two patients had underlying history of burns leading to chronic wounds. Cutaneous zygomycoses were seen among these patients. Zygomycoses is also unique in that it is resistant to both voriconazole and Echinocandins. Amphotericin B is the only chemotherapeutic agent found effective against this. This is a challenge for treatment because clinicians use voriconazole as the first-line drug due to decreased cost and lower adverse effects of this agent. Of the fungi speciated, Mucor spp. It was found to be the most common and also the most aggressive as the two fatalities were diagnosed with Mucormycosis. Mucor spp.was also responsible for the two cases of cutaneous Zygomycoses.

5. Conclusion

Emerging lifestyle diseases like diabetes mellitus and newer treatment modalities for cancer and other chronic conditions have led to the re-emergence of invasive fungal infections, of which Zygomycoses is the most aggressive. Multiple diagnostic modalities must be used in view of the aggressive nature of the disease, but microbiological diagnosis remains the Gold Standard. The aggressive natural history of the disease makes early diagnosis of paramount importance, and therefore these samples should be given priority in the lab and the results of various tests communicated to the clinician as soon as possible. Any episode of sinusitis in a diabetic patient that does not respond to antibiotics must be given a high index of suspicion for invasive fungal infections.

References

[1] M.M. Roden , T.E. Zaoutis, W.L. Buchanan et al. Epidemiology and Outcome of Zygomycosis: A Review of 929 Reported Cases. Clinical Infectious Diseases 41 (2005) 634–53. http://dx.doi.org/10.1086/432579.

[2] C.E. Gonzalez, M.G. Rinaldi and A.M. Sugar Zygomycosis. Infectious Disease Clinics of North America 16 (2002) 895–914. http://dx.doi.org/10.1016/S0891-5520(02)00037-5.

[3] R.N. Greenberg, L.J. Scott, H.H. Vaughn and J.A. Ribes Zygomycosis (mucormycosis): emerging clinical importance and new treatments. Current Opinion in Infectious Diseases 17 (2004) 517–25. http://dx.doi.org/10.1097/00001432-200412000-00003.

[4] C.A. Kauffman. Zygomycosis: reemergence of an old pathogen. Clinical Infectious Diseases 39 (2004) 588–90. http://dx.doi.org/10.1086/422729.

[5] R.M. Prabhu and R.Patel. Mucormycosis and entomophthoramycosis: a review of the clinical manifestations, diagnosis and treatment. Clinical Microbiology and Infection 10 (Suppl 1) (2004) 31–47. http://dx.doi.org/10.1111/j.1470-9465.2004.00843.x.

[6] A. Paultauf Mycosis mucorina. Virchows Archiv. A, Pathological anatomy and histology 102 (1885) 543. http://dx.doi.org/10.1007/BF01932420.

[7] J.A.Vazquez and J.D. Sobel. Fungal infections in diabetes. Infectious Disease Clinics of North America. 9 (1995) 97–116.

[8] W.A. Limongelli, M.S. Clark, R. Saglimbene, E.Baden, J.A.Washington and A.C.Williams. Successful treatment of mucocutaneous mucormycosis after dental extractio0s in a patient with uncontrolled diabetes. Journal of Oral and Maxillofacial Surgery 33 (1975) 705–712.

[9] K.A. Marr, R.A. Carter, F. Crippa, A. Wald and L. Corey. Epidemiology and outcome of mould infections in hematopoietic stem cell transplant recipients. Clinical Infectious Diseases 34 (2002) 909–917. http://dx.doi.org/10.1086/339202.

[10] D.P. Kontoyiannis, M.S. Lionakis, R.E. Lewis, et al. Zygomycosis in a tertiary-care cancer center in the era of *Aspergillus*-active antifungal therapy: a case-control observational study of 27 recent cases. The Journal of Infectious Diseases 191 (2005) 1350–1360. http://dx.doi.org/10.1086/428780.

[11] J.R. Boelaert, A.Z. Fenves and J.W. Coburn. Deferoxamine therapy and mucormycosis in dialysis patients: report of an international registry. American Journal of Kidney Diseases 18 (1991) 660–667. http://dx.doi.org/10.1016/S0272-6386(12)80606-8.

[12] A. Skiada, A.H. Groll, L. Pagano, R.H. Zimmerli, O. Lortholary and G. Petrikkos. Diagnosis and treatment of zygomycosis: guidelines from the 3rd European Conference on Infections in Leukemia (ECIL 3) Haematologica 98(4) (2013) 492-504. http://dx.doi.org/10.3324/haematol.2012.065110.

[13] D. Neofytos, D. Horn, E. Anaissie, et al. Epidemiology and outcome of invasive fungal infection in adult hematopoietic stem cell transplant recipients: analysis of Multicenter Prospective Antifungal Therapy (PATH) Alliance registry. Clinical Infectious Diseases 48 (2009) 265-273. http://dx.doi.org/10.1086/595846.

[14] M.J. Ruping, W.J. Heinz, A.J. Kindo, et al. Forty-one recent cases of invasive zygomycosis from a global clinical registry. Journal of Antimicrobial Chemotherapy 65 (2010) 296-302. http://dx.doi.org/10.1093/jac/dkp430.

[15] A. Chakrabarti, S.S. Chatterjee, A. Das, et al. Invasive zygomycosis in India: experience in a tertiary care hospital. Postgraduate Medical Journal 85 (2009) 573-581. http://dx.doi.org/10.1136/pgmj.2008.076463.

[16] D.P. Kontoyiannis, V.C.Wessel, G.P. Bodey and K.V. Rolston. Zygomycosis in the 1990s in a tertiary-care cancer center. Clinical Infectious Diseases 30 (2000) 851–856. http://dx.doi.org/10.1086/313803.

[17] J.A. Ribes, C.L. Vanover-Sams and D.J. Baker. Zygomycetes in human disease. Clinical Microbiology Reviews 13 (2000) 236–301. http://dx.doi.org/10.1128/CMR.13.2.236-301.2000.