

Research Article

Histopathological study of cutaneous and soft tissue fungal infections

Siva Kaliyamoorthy*, Sowmya Srinivasan

Department of Pathology, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India

Received: 12 March 2016

Accepted: 22 April 2016

***Correspondence:**

Dr. Siva Kaliyamoorthy,

E-mail: docsiva.k@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The spectrum of fungal infection is varied ranging from cutaneous to invasive infections. In most instances it is asymptomatic and localized. In immunocompromised individuals it can be invasive, involving the visceral organs and can become symptomatic. The objective was to study and document the spectrum of fungal lesions histopathologically diagnosed in the Department of Pathology, SMVMCH, India.

Methods: Cases for a period of 7 years spanning from January 2007- December 2013 were taken for this study. The diagnosis was based on the hematoxylin & eosin (H&E) stained sections and special stains like periodic acid schiff (PAS) and Gomori's methenamine-silver (GMS) were used to identify the fungal elements.

Results: A total number of 10 cases were positive for fungal infection. All were found in the skin, mucous membrane and soft tissue location. Among these, 3 were Maduromycosis, 3 were phaeohyphomycosis, 2 were dermatophytosis and 1 case each of aspergillosis and chromoblastomycosis were seen. All patients had localized infection and there was no evidence of immunocompromised status. No invasive fungal lesion was found over the 7 year period of study.

Conclusions: H&E stain is helpful for identification of fungal elements and tissue reaction, since most of these cases (7 of 10 cases) presented with pigmented fungi. Histopathology is mandatory for ensuring diagnosis and for further management since these patients clinically present as asymptomatic soft tissue lesions.

Keywords: Pigmented fungi, Localized, Cutaneous and soft tissue

INTRODUCTION

Fungal infections can occur as localized or as invasive lesions. Most often they are localized and asymptomatic. Invasive lesions are usually symptomatic associated with immunocompromised status and they involve visceral organs.¹

Cutaneous fungal infections can either be superficial as in case of dermatophytosis or deep, infiltrating subcutaneous fat and underlying soft tissue as in cases of aspergillosis, chromoblastomycosis, phaeohyphomycosis and eumycosis. The host response in the superficial and deep cutaneous involvement is variable and largely

dependent on the immune status of the affected individual.²

The presence of fungi is demonstrated by special stains like PAS and GMS in the tissue.³ Apart from these stains, the tissue response also gives an indication that the lesion may be due to a fungal organism. The reaction can vary for different fungi, as neutrophils in the corneal layer in dermatophytosis and as an epithelioid or histiocytic granulomatous reaction with neutrophils and eosinophils in a deep fungal infection.¹

The objective was to study and document the spectrum of fungal lesions histopathologically diagnosed in the Department of Pathology, SMVMCH, Puducherry, India.

METHODS

Cases for a period of 7 years spanning from January 2007-December 2013 were taken for this study. The diagnosis was based on the hematoxylin & eosin stained sections and special stains like periodic acid schiff (PAS) and Gomori's methenamine-silver (GMS) were used to identify the fungal elements. The nature of tissue response and the morphological identification of the fungal organism were correlated.

RESULTS

A total of 10 cases were positive for fungal infection, involving the skin, mucous membrane and soft tissue location. There were 3 cases of maduromycosis, 3 cases of phaeohyphomycosis and 2 cases of dermatophytosis, 1 case each of aspergillosis and chromoblastomycosis. All patients had localized infection and there was no evidence of immunocompromised status. No invasive fungal lesion was found over the 7 year period of study.

The common age group of patients affected was the 5th decade and only one patient with maduromycosis was in paediatric age group. Males (6 patients) were affected more commonly than females (4 patients). Out of ten cases two cases presented with fungal infection following injury and 4 cases presented with sinus discharge. All 3 cases of maduromycosis and single case of chromoblastomycosis had discharging sinuses. Most common location was found to be the extremities. Out of ten cases, seven cases had pigmented fungi (Table 1).

All the 10 cases had associated tissue reactions like neutrophilic infiltration, microabscess and foreign body giant cell reaction.

All the three patients diagnosed with maduromycosis presented with sinus discharge. Microscopically abscess

cavity was filled with brown pigmented fungi which were found on H&E stain. Overlying skin was ulcerated and the fungi infiltrated up to the subcutaneous plane.

All the three patients of phaeohyphomycosis presented clinically as soft tissue swellings. On microscopic examination they were subcutaneous phaeohyphomycotic cysts and fungi were seen in the lumen of the pseudo cyst surrounded by foreign body giant cells and xanthogranulomatous reaction. Presence of fungi was identified on H&E as pale brown pigmented septate hyphae and was confirmed by using special stains like PAS and GMS.

Table 1: Age and gender distribution of fungal lesions with site of involvement.

Fungus	Age	Sex	Site of involvement
Maduro mycosis	45	M	Left ankle with sinus discharge
Maduro mycosis	8	M	Left upper chest with sinus discharge
Maduro mycosis	40	M	Right foot with sinus discharge
Pheohyphomycosis	48	M	Left ankle
Pheohyphomycosis	28	F	Nail matrix
Pheohyphomycosis	57	M	Right foot
Dermatophytosis	30	F	Right foot
Dermatophytosis	52	F	Occipital & parietal
Aspergillosis	45	F	Right infraorbital and left maxillary sinus
Chromoblastomycosis	43	M	Right leg with sinus discharge

Table 2: Clinical presentation and tissue response of the fungal lesions in the present study.

Fungal lesion	Number of cases	Clinical presentation	Tissue response
Maduromycosis	3	Nodules with ulceration	Ulcer, neutrophilic microabscess
Phaeohyphomycosis	3	Soft tissue swellings	Subcutaneous cyst with xanthogranuloma and foreign body giant cells
Dermatophytosis	2	Eczema(1) Alopecia(1)	Neutrophils in stratum corneum and around hair follicle
Aspergillosis	1	Friable nasal polyp	Eosinophils, foreign body giant cells
Chromoblastomycosis	1	Sinus discharge	Neutrophilic abscess

Out of two cases of *tinea* infections, one was in stratum corneum as superficial dermatophytosis and the other was in hair follicle as *Tinea capitis*. Neutrophilic inflammatory infiltrate was seen in the stratum corneum

and PAS stain showed thin fungal filaments in the stratum corneum in case of superficial dermatophytosis. In the case of *Tinea capitis* the patient presented with alopecia and abscesses over the scalp. Clinically there

was suspicion of bacterial folliculitis. Microscopically there were perifollicular neutrophilic aggregates and fungal spores were seen within the hair follicle, which were PAS positive.

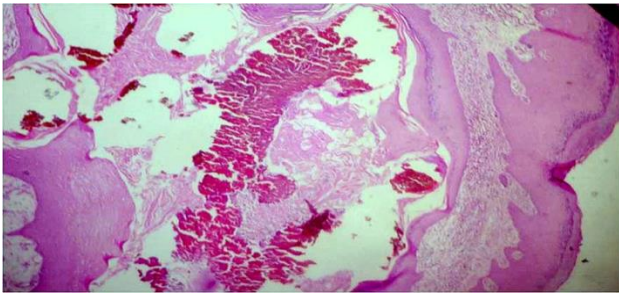


Figure 1: Maduromycosis; brown pigmented fungal colonies surrounded by neutrophilic micro abscess in the subcutaneous plane, H & E, 10 x.

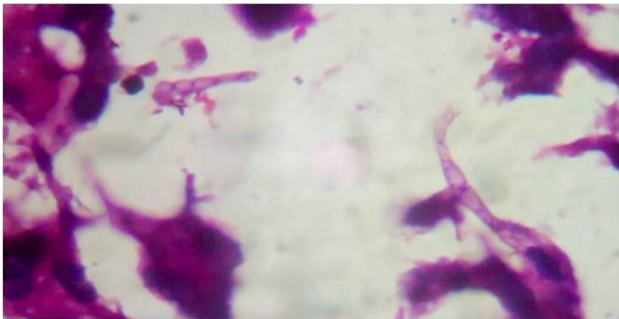


Figure 2: Phaeohiphomycosis; pale brown pigmented fungal hyphae surrounded by histiocytic aggregates, H & E, 10 x.

The patient with aspergillosis had nasal obstruction and clinically had friable nasal polyp. Histopathological examination showed lymphoplasmacytic infiltrate, eosinophils and foreign body giant cells along with thin filamentous, septate hyphae with acute angle branching and spores which were identifiable on PAS and GMS stains.



Figure 3: Aspergillosis; thin filamentous septate hyphae with acute angle branching, GMS, 40 x.



Figure 4: Chromoblastomycosis; sclerotic body of chromoblastomycosis, GMS, 40 x.

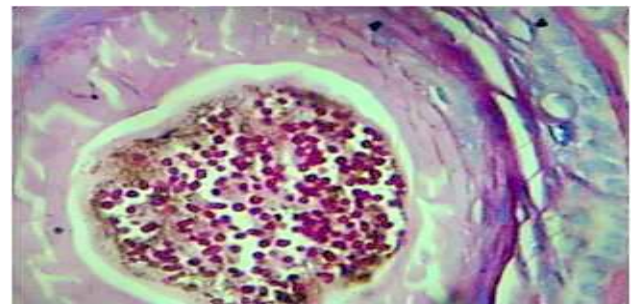


Figure 5: Dermatophytosis; *Tinea capitis*: fungal spores within a hair follicle, PAS, 40 x.

Table 3: Comparison of presentation of fungal lesions with other studies.

Diseases	Findings	Author	Present study
Maduromycosis	Extremities – trauma-sinus discharge	Murthy et al ⁴ (n=1)	Extremities – trauma- sinus discharge (n=3)
Phaeohiphomycosis	Extremity – solitary cyst	Ponnuswamy ⁵ et al (n=2)	Extremities – solitary cyst (n=3)
Chromoblastomycosis	Extremity – sinus discharge	Murthy et al ⁴ (n=1)	Extremity – sinus discharge (n=1)
Aspergillosis	Sino orbital and left maxillary sinus	Agarwal et al ⁷ (n=25)	Orbital and left maxillary sinus (n=1)

The patient with chromoblastomycosis had a history of trauma followed by sinus discharge. There were microscopic ulcerations over the epidermis and brown pigmented sclerotic bodies were seen extruding through

the sinus openings above the cornified layer surrounded by neutrophils. Fontana Masson stain was positive revealing melanin in the sclerotic bodies.

Table 4: Host tissue response for fungal infections.

Disease	Usual host reaction ^{1,2}	Tissue response in our study
Eumycotic mycetoma	Adherence of neutrophils, granuloma with Langhans giant cells	Neutrophilic microabscess
Phaeohyphomycosis	Subcutaneous cystic or dispersed granuloma	Subcutaneous cyst with xanthogranuloma and foreign body giant cells
Dermatophytosis	Hyperkeratosis, acanthosis and mild mononuclear infiltrate in dermis	Neutrophils in stratum corneum and around hair follicle
Chromoblastomycosis	Mixed suppurative and granulomatous reaction	Neutrophilic abscess

DISCUSSION

Fungal infections are not frequently encountered. Over a period of 7 years only 10 cases were identified in our study and all were incidental diagnosis. There were 3 cases each of maduromycosis and phaeohyphomycosis, 2 cases of dermatophytosis, 1 case each of aspergillosis and chromoblastomycosis. All were localized lesions and occurred in patients with no evidence of immunosuppressed/ immunocompromised status. There was male predilection. Common age of occurrence was 5th decade.

Mycetoma is more commonly seen than other fungal infections. The disease frequently involves lower extremities. Males are commonly affected.² All 3 cases in our study presented with sinus discharge and two cases presented with fungal infection following injury. These findings were similar to the study by Murthy et al.⁴ Microscopically all three cases showed abscess cavity in the dermis which contained granules along with neutrophilic infiltrate and granuloma. Granules stain positive with PAS but negative for gram staining which differentiates it from actinomycetoma. The granules of eumycetoma are formed by thick septate hyphae, whereas actinomycotic granules are thin, fine branching gram positive bacterial organisms.^{3,4} Maduromycoses slowly spread, they usually remain localized to the skin and subcutaneous tissue. Haematogenous and lymphatic spread may occur.¹

Phaeohyphomycosis is a fungal infection that commonly presents as solitary cyst in the distal parts of extremities. Some cutaneous lesions may be nodular. Males are affected more commonly than females. Common age group is 45 to 60 years. Histological examination reveals overlying skin to be usually unaffected. Cyst wall shows lymphocytes, epithelioid histiocytes, multinucleated

foreign body type giant cells and suppurative granuloma. Brown septate hyphae and chains of budding yeast like fungi are present.¹ All cases of phaeohyphomycosis in our study showed cysts microscopically and fungi were seen within the lumen of the cyst. Our study results were similar with that of Ponnuswamy et al.⁵

Dermatophytosis is a superficial mycosis, involves the skin, hair and nail. Hyperkeratosis, acanthosis, neutrophils in stratum corneum and mild mononuclear infiltrate in dermis are the characteristic findings. *Tinea capitis* shows hyphae and conidia invading the stratum corneum, hair follicles and hair shafts along with perifollicular lymphohistiocytic infiltrate. Rupture of hair follicles elicits acute suppurative inflammation and granuloma.² The microscopic findings of both cases in our study and female predilection correspond to the study by Bhagra et al.⁶

Chromoblastomycosis is a fungal infection presenting with sinus discharge, mostly involving lower extremities. Plaque or solid nodule develops in the skin at the site of traumatic implantation. Microscopically pseudoepitheliomatous hyperplasia with abscess and numerous round, thick walled, dark brown muriform cells (sclerotic bodies) are seen within dermis. Since the sclerotic bodies contain melanin, they are positive for Fontana Masson stain. The common tissue response is granulomatous and suppurative inflammatory reaction. The features of the single case in our study were similar to that of Murthy et al.⁴

The patient with aspergillosis presented with multiple nasal polyps and papules over the infra orbital region. It is the second most common opportunistic mycosis among patients with malignant diseases. Microscopically hyphae are arranged in radiate fashion, are septate with acute

angle branching. Our study results were correlating with the results of Agarwal et al.⁷

CONCLUSION

Histopathology is mandatory for ensuring diagnosis and for further management in fungal infections since these patients clinically present as asymptomatic soft tissue lesions. In the hosts with no evidence of immunosuppression they occur as localized, non-invasive lesions. Identification of fungal elements is based on the H&E stain, which is helpful to recognize fungi due to the tissue reaction. In case of tissue responses like granulomatous reactions, foreign body giant cells, neutrophils and eosinophilic infiltrates, special stains like PAS and GMS should be used to identify the fungal organisms. Since most of the lesions in our study were due to pigmented fungi, H&E stain was also helpful for identification of fungal morphology.

ACKNOWLEDGEMENTS

Authors would like to thank technical staff of Department of Pathology, SMVMCH, Puducherry and Dr. Muruganandhan.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Damjanov I, Linder J. Andersons pathology, tenth edition.1996:951-62.
2. Elder DR. Levers Histopathology of the skin. 10th ed. Philadelphia; Wolter Klnwer/ Lippincott Williams & Willams, 2008.
3. Bancroft D, Gamble M. Theory and practice of histological techniques.5th ed.2002.
4. Murthy R, Swain JP. Concurrent mycetoma and chromomycosis. Indian J Med Microbiol. 2011;29:437-9.
5. Karkuzhali P, Yogambal M, Karthik S. Two Cases of Multiple Subcutaneous Cystic Phaeohyphomycosis in Immunocompromised Patients with a Rare Causative Organism. Indian J Dermatol. 2014;59(4):421.
6. Bhagra S, Ganju SA, Kanga A, Sharma NL, Guleria RC. Mycological pattern of dermatophytosis in and around Shimla hills. Indian J Dermatol. 2014;59:268-70.
7. Agarwal R, Gupta D, Aggarwal AN, Behera D, Jindal SK. Allergic bronchopulmonary aspergillosis: lessons from 126 patients attending a chest clinic in north India. Chest. 2006;130(2):442-8.

Cite this article as: Kaliyamoorthy S, Srinivasan S. Histopathological study of cutaneous and soft tissue fungal infections. Int J Res Med Sci 2016;4:1933-7.