

# Parasitic and Fungal Infections Presenting As Subcutaneous Lesions Diagnosed By Fine Needle Aspiration Cytology - A Study of One Year

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## ABSTRACT

Despite remarkable progress in prevention and treatment, there is an increase in incidence of parasitic and fungal infections in our country. Fine needle aspiration cytology (FNAC) offers an easy, reliable and a minimally invasive method to diagnose various fungal and parasitic lesions. Early and definitive diagnosis in such cases is mandatory to rule out other differential diagnosis like neoplasms, inflammatory lesions and to help the clinicians for appropriate management of the patients. FNAC is a well established diagnostic technique to aid in early diagnosis of the lesion which can be managed conservatively and thus can prevent undue surgery.

This is a retrospective study in which we evaluated forty cases who presented with subcutaneous lesions of suspected parasitic/ fungal aetiology and were sent for FNAC. The cytology smears were reviewed and evidence of parasite/parasitic fragment or fungal infection was noted along with other cytomorphological features.

**Keywords** – Subcutaneous lesions, FNAC, Parasitic infection, Fungal infection.

## INTRODUCTION

The diagnostic role of FNAC was first described by Kung *et al.* in 1989. [1] It is a simple, rapid and effective diagnostic technique which is minimally invasive and is done as an out-patient procedure. It can easily help in the diagnosis of inflammatory and infective lesions and can help in ruling out the possibility of malignancy in suspicious cases.

An increase in size of the population at risk, which includes HIV infected individuals, transplant recipients, cancer patients, patients who stay in hospital for prolonged period, those who undergo various invasive procedures, have altered the incidence and prevalence of the fungal infections. [2]

Recent trends of therapy with widespread and prolonged use of broad-spectrum antibiotics, chemotherapeutic agents, immunosuppressive drugs and radiotherapy have also led to increase in incidence of fungal infections.

In cases of suspected fungal infections, diagnosis by culture takes a long time and all fungi cannot be cultured. More over microbiological examinations can be misguided by contamination of other fungi and bacteria.

Serological reactions lack complete specificity. In this scenario, fine needle aspiration cytology proves to be one of the major diagnostic tools because it permits rapid, presumptive identification of fungal infections. [3]

Parasitic zoonoses affect human as well as animal health directly or indirectly, which may affect the socioeconomic condition of the country as a whole. Poor economic conditions, poor sanitation, improper water supply, and personal habits are some of the causes of harbouring the parasitic zoonotic infections in the Indian subcontinent. [4]

Specific parasites such as filariasis, hydatid disease, and cysticercosis can be easily diagnosed by FNAC.

The present study was done to analyse the role of FNAC in the diagnosis of various parasitic and fungal infections presenting as subcutaneous lesions in various parts of the body.

## MATERIALS AND METHODS

This was a retrospective study of one year duration in which FNAC records of all patients presenting with subcutaneous lesions of suspected parasitic/fungal etiology were included. A total of 40 cases were evaluated.

The clinical details were obtained from the FNAC requisition forms. The subcutaneous lesions were aspirated using a 23 G needle and 10 ml syringe. The aspirated cytological material was smeared

on glass slides. In cases of fluid aspirate from cystic lesion, smears were prepared from cystic fluid after cytocentrifugation. The air-dried smears were stained with May-Grünwald-Giemsa (MGG) stain after fixation in methanol.

The FNAC smears were reviewed and evidence of parasite/parasitic fragment or fungal infection was noted along with other cytomorphological features. Various inflammatory responses by the fungal or parasitic infections were also noted in cases where the actual organism could not be detected.

The age, sex of the patient and site of the lesion were also noted.

## RESULTS

During one year of study, 40 cases were of suspected parasitic/fungal aetiology were advised fine needle aspiration cytology. The clinical features of all the cases are tabulated (Table 1). All the cases were in the age group of 10 – 35 years. Most of the swellings were present on the extremities however few swellings were also seen in unusual locations like on the face, neck and thoraco-abdominal wall (Figure 1). The swellings varied in size from 1 cm in diameter to 4.5 cm in diameter.

**Table 1: Clinical data and cytological features of all the cases included in present study (n=40)**

Cytological diagnosis	No. of cases	Age group (yrs)	Sex	Sites
Cysticercosis	14	15 - 35	M:F=9:5	Arm, leg, thoraco-abdominal wall
Suspicious parasitic lesion	10	10 - 30	M:F=7:3	Arm, leg, neck
Fungal abscess	11	26-34	M:F=7:4	Face, arm, neck
Lipoma	2	25-28	M:F=1:1	Arm
Reactive lymphadenitis	2	15-18	M:F=1:1	Axilla
Epidermal inclusion cyst	1	20	M=1	Flexor aspect of forearm



**Figure 1: Multiple subcutaneous swellings seen on the thoraco-abdominal wall.**

Out of 40 cases, 26 cases were males and 14 were females. In 14 cases actual parasitic structures were demonstrable in the smears (Figure 2).

In 10 cases cytological features were suggestive of a parasitic cyst but no actual parasitic structures were seen. The smears showed a mixed inflammatory infiltrate comprising neutrophils, lymphocytes, eosinophils, histiocytes and multinucleated giant cells.

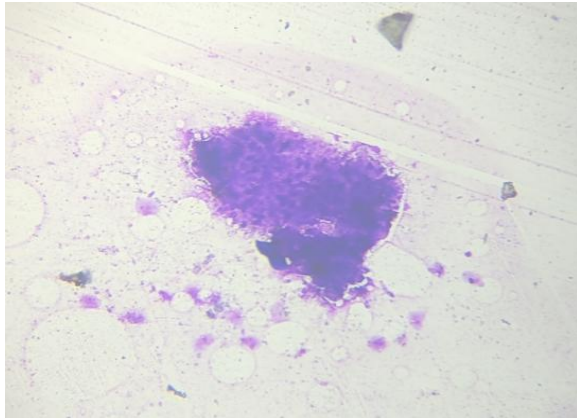


Figure 2: Fragments of bladder wall of cysticercus in a clear acellular background (Giemsa 40X).

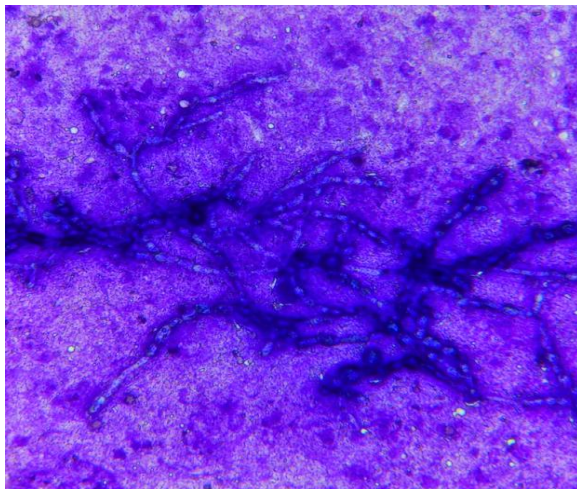


Figure 3: Smears show presence of slender fungal hyphae in a necrotic background (Giemsa 20X).

In 11 cases, fungal hyphae were identified along with multinucleated giant cells in a necrotic background suggestive of fungal abscess (Figure 3).

2 cases showed mature adipose tissue fragments suggestive of a lipoma. 2 cases showed features of reactive lymphadenitis. 1 case showed anucleate squames suggestive of an epidermal inclusion cyst (Figure 4).

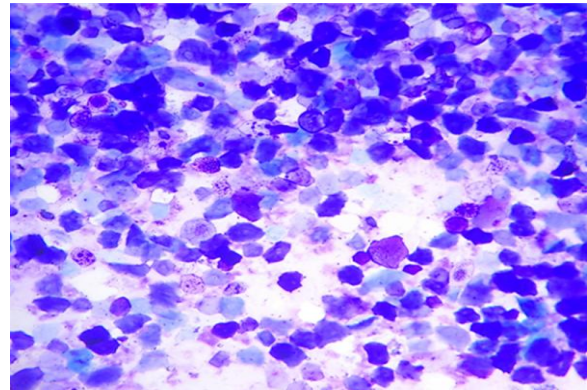


Figure 4: FNAC smear showing presence of anucleated squames suggestive of epidermal inclusion cyst (Giemsa 20X)

The pie chart shows the distribution of various lesions according to the cytological diagnosis (Figure 5).

Distribution of lesions according to cytological diagnosis

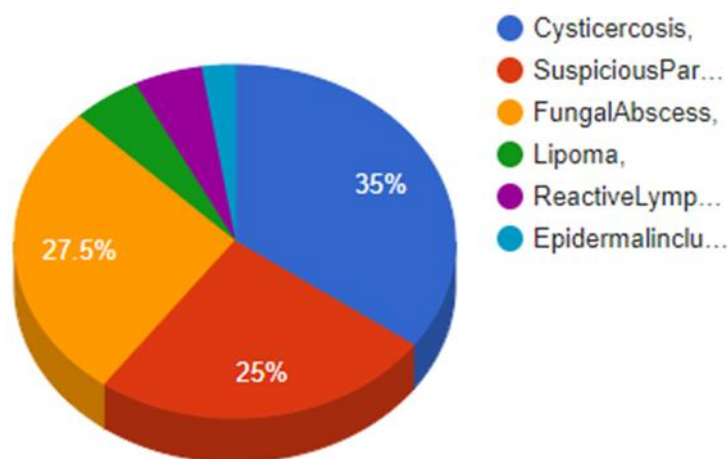


Figure 5: Pie chart showing distribution of lesions according to cytological diagnosis.

## DISCUSSION

FNAC is low cost outpatient procedure for pre-operative diagnosis of

parasitic and fungal swellings and may even eliminate the need for open biopsy. <sup>[5]</sup>

The cytological diagnosis is quite clear cut and undemanding in cases where actual parasite structure is identifiable in the smears. In our one year study we received forty cases which were clinically suspected to be of parasitic/fungal infections.

Most of these swellings were observed in children and young adults with higher predilection in males as compared to females.

Out of these forty cases, most of the cases (35 percent) were due to cysticercosis which is the larval form of the cestode *T. solium*. The cysticercus can be found in any organ, but is especially common in skeletal muscle, subcutaneous tissue, eyes and the central nervous system. Cysticercus nodules in the skin are difficult to differentiate from benign mesenchymal tumours and reactive lymphadenitis on clinical grounds alone. [1]

FNAC can help us in differentiating these entities easily and helps us in arriving at conclusive diagnosis.

Various other diagnostic modalities which are employed to detect cysticercosis include radiology and serological investigations. CT Scans and MRI, though sensitive in diagnosing cysticercosis especially when the parasite involves the CNS, are very expensive. [6] Moreover they provide only supportive diagnosis. Serological tests are useful if they are positive but cannot rule out the disease with negative results. False positivity is expected with past parasitic infection or cross reactivity with other helminths. Thus, FNAC has emerged as a widely acceptable technique for the diagnosis of parasitic infections like cysticercosis. [7]

The diagnosis of a cestode infection like cysticercosis is made on cytological examination when fragments of larval cuticle, parenchyma or scolex are identified. [8]

The viable cyst, the necrotic and calcified lesions all have distinctive cytomorphological pattern. The viable cyst yields clear fluid and show fragments of bladder wall in a clear acellular background. The parasitic fragments comprise bluish

fibrillary structures, which are part of the bladder wall and contain tiny parasitic nuclei that appear dot-like. [9]

Single and detached hooklets may be the only recognisable remnants in aspirates of calcified cysts.

Aspirates of necrotic and degenerated lesions may contain fragments of bladder wall including calcareous corpuscles, detached single hooklets and an infiltration of inflammatory cells associated with development of foreign body granulomas. A careful search for hooklets is indicated whenever there is clear fluid aspiration, as single and detached hooklets maybe only recognizable remnants in aspirates of calcified cysts. [10]

A wet mount preparation should be examined microscopically, as it shows hooklets and scolexes. Sometimes these may be the only evidence of parasite and there may be no evidence on giemsa stained smear.

In 25 percent of our cases no actual parasitic structure was identified in the smears, however a parasitic aetiology was suspected due to the presence of eosinophils, neutrophils, palisading histiocytes and multinucleate giant cells.

Specific parasite species identification can be done by histopathological examination and by serology. However, treatment modality for most helminthic infections remains the same, therefore a broad umbrella diagnosis of helminthic infection, class cestode may be rendered on FNAC in economically limited settings.

FNAC is an easy, reliable and a minimally invasive method to diagnose various fungal lesions in the body.

Most fungi are diagnosed on cytology specimens by their morphology rather than their staining properties. The most common clue and observation to diagnose fungal infection is necrotic material admixed with acute inflammatory response. Fungal hyphae should be examined in FNAC smears showing features of an infective aetiology. In our

study, 27.5 percent of the cases showed presence of fungal hyphae along with multinucleate giant cells. In such cases, early and definitive diagnosis is mandatory to rule out other differential diagnosis like neoplasms, inflammatory lesions and to help clinicians for appropriate management of the patients. FNAC is a well-established diagnostic technique to aid in early diagnosis of the lesion which can be managed conservatively and thus can prevent undue surgery.

Morphological diagnosis of fungal infections by cytology is not intended to replace microbiological confirmation. It helps in rapid initial diagnosis and is a safe, cost-effective method of specimen procurement for the patients, clinicians and cytologists and provides a helping hand to microbiologists.

Definitive species identification by culture and molecular sequencing will aid in early initiation of treatment of the patient.

## CONCLUSION

Parasitic and fungal aetiologies are important differential diagnosis of subcutaneous lesions and FNAC is rapid, safe, cheap and reliable diagnostic tool for differentiating these lesions. Careful assessment of cytological material is helpful to detect parasites, fungi or inflammatory response to parasites/ fungi even in asymptomatic patients. The spectrum of host response may vary from no reaction to a marked inflammatory response. The entire spectrum of changes should be kept in mind while practicing cytopathology in an endemic area. In such situations, a high

index of suspicion and careful examination of cytology smear is the key to correct diagnosis.

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