

Research Article**CYTOMORPHOLOGICAL SPECTRUM OF BREAST TUBERCULOSIS
DIAGNOSED BY FINE-NEEDLE ASPIRATION CYTOLOGY: A CASE
SERIES OF 12 CASES**

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Received date: 20-08-2026, Date of Acceptance: 30-08-2026,

Date of publication: 31-08-2026

Abstract

Background: Tuberculosis of the breast is an uncommon manifestation of extrapulmonary tuberculosis and may clinically mimic breast carcinoma, pyogenic abscess, granulomatous mastitis and other inflammatory breast lesions. Fine-needle aspiration cytology (FNAC) is a minimally invasive and cost-effective technique that can facilitate an early diagnosis, particularly in tuberculosis-endemic regions. Demonstration of granulomatous inflammation and acid-fast bacilli (AFB) on cytological material can provide strong evidence of tuberculous mastitis.

Objective: To describe the clinical presentation and cytomorphological spectrum of breast tuberculosis diagnosed by minimal invasive FNAC. Knowledge of its varied clinical presentation and diagnostic modalities help in diagnosing this easily treatable disease.

Materials and Methods: A retrospective descriptive case series of 12 patients with breast or subareolar/axillary lesions evaluated by FNAC was undertaken. Special staining for acid-fast bacilli was performed where indicated. The cytological findings were correlated with the available clinical and ultrasonographic information.

Results: The 11 patients were females aged 25–59 years and 1 male of 42 years age. Most lesions involved the right breast. One fourth of patients presented with history of lactation. The cytological spectrum included inflammatory cells, granulomas, multinucleated giant cells, macrophages, degenerated epithelial cells and necrotic/degenerative material. Acid-fast bacilli were recorded as positive in all the cases.

Conclusion: Breast tuberculosis should be considered in the differential diagnosis of breast masses and inflammatory lesions, particularly in endemic regions. FNAC,

supplemented by appropriate special stains, provides a rapid and minimally invasive method for diagnosis. Recognition of granulomatous inflammation and targeted AFB staining can help distinguish tuberculous mastitis from other granulomatous breast diseases and potentially avoid unnecessary surgical procedures.

Keywords: Breast tuberculosis, FNAC, acid-fast bacilli, breast lesion.

INTRODUCTION

Tuberculosis remains an important infectious disease in India and other developing countries. It continues to be a major health hazards along with new diseases like HIV, which resulted in resurgence of extra pulmonary tuberculosis. In 1993, WHO declared tuberculosis to be a global emergency. It is among top ten infectious causes of global mortality with an incidence rate of 150 cases per 100,000 people in 2005.¹ Currently, one person becomes newly infected every second world wide². Although the lungs are the most frequently involved organ, extra pulmonary tuberculosis may affect virtually any organ system. Tuberculosis of the breast is relatively uncommon and constitutes a small proportion of breast lesions.

The breast tissue is remarkably resistant to tubercular infection. This is due to the fact that like the skeletal muscles and the spleen, the mammary tissue too provides an infertile environment for the survival and multiplication of tubercle bacilli.^{3,4} It occurs more frequently in females especially in their reproductive age (21–30 years) and is uncommon in prepubescent and elderly women.⁵ In pregnant and lactating women,

the breast is more vascular with dilated ducts. This increased vascularity of the breast may facilitate infection and dissemination of bacilli.^{1,4} Shinde *et al*¹ and Banerjee *et al*.⁴ found in their studies that 7% and 33% of their patients respectively were lactating at the time of presentation.

Breast tuberculosis is diagnostically challenging because its clinical presentation is nonspecific. Patients may present with a solitary breast lump, multiple nodules, pain, abscess formation, nipple or skin changes, or an axillary mass.⁶ These manifestations can closely resemble breast carcinoma or other inflammatory breast disorders.

The diagnosis traditionally relies on demonstration of characteristic granulomatous inflammation with caseous necrosis and/or identification of *Mycobacterium tuberculosis*. FNAC has an important role in this setting because it is inexpensive, rapid, minimally invasive and can be performed as an outpatient procedure. Cytological examination may reveal epithelioid granulomas, multinucleated giant cells, necrosis and mixed inflammatory cells.⁷ Demonstration of AFB on Ziehl–Neelsen staining provides additional diagnostic support.

The present study describes the cytological findings in a series of 12 breast and related lesions diagnosed as tuberculous/inflammatory lesions on FNAC, with particular emphasis on the spectrum of granulomatous inflammation and AFB positivity.

MATERIALS AND METHODS

Study design: This was a retrospective descriptive case series based on the available

FNAC case records.

Study population: Eleven female patients and one male patient with breast lesions were included in the study.

Data analyzed

The following parameters were extracted from the record:

- Age
- Sex
- Laterality
- Anatomical location
- Approximate lesion size
- Clinical presentation
- Ultrasonographic findings, where recorded
- Cytological findings
- Special-stain findings
- Cytological impression/diagnosis

Cytological evaluation

FNAC material was evaluated for cellularity, inflammatory cell population,

granulomatous inflammation, multinucleated giant cells, macrophages, degenerated epithelial cells and necrotic/degenerative material.

In cases where tuberculosis was suspected, acid-fast staining was performed. AFB positivity recorded in the case register was considered supportive of tuberculous infection.

RESULTS

Eleven female patients and one male patient were included in the series. Their ages ranged from 25 to 59 years, with a mean age of 39 years and median age of 37.5 years.

The recorded lesion dimensions ranged from 2 × 1 cm to 6 × 5 cm. The majority of lesions were located in the right breast, while one lesion was recorded in the left breast. Lesions involved the upper outer quadrant, lower outer quadrant and subareolar region

Table 1. Clinical and cytological profile of the cases

Case	Age	SEX	Site/laterality	Lesion size	Recorded clinical/USG findings	Cytological findings/diagnosis
1	38	F	Right breast, UOQ	3.5 × 2.5 cm	Irregular lesion; mobile; BIRADS 4 on USG	Ductal epithelial and myoepithelial cells macrophages/granulomatous inflammatory component; AFB positive
2	59	F	Right breast	6 × 5 cm	Red skin, nipple retracted; USG show	Lymphocytes/macrophages/giant cells with granulomatous inflammation; AFB positive

					collection	
3	25	F	Right breast, LOQ	2 × 2 cm	Hard/soft lesion; USG show hypodense multiple areas	Granulomas, giant cells, Ductal epithelial and myoepithelial cells ; AFB positive
4	37	F	Right Breast, subareolar region	4 × 3 cm	Solid mass; cystic component; USG-neoplastic lesion	Inflammation; Ductal epithelial (mild atypia seen) and myoepithelial cells ; AFB positive
5	30	F	Right Breast, subareolar region	2 × 1 cm	—	Inflammatory cytology with giant cells; AFB positive
6	34	F	Right breast	4 × 2 cm	Soft to firm, USG-Fibrocystic disease	Ductal epithelial and myoepithelial cells macrophages, granulomas and giant cells; AFB positive
7	54	F	Right breast	2 × 1 cm	Soft to firm mass USG-edematous glandular breast parenchyma History of tuberculosis present	Inflammatory changes in glandular breast parenchyma; AFB positive
8	42	M	Left breast	2 × 2 cm	Inverted nipple; skin excoriation; pus positive History of Tuberculosis	Granulomatous mastitis
9	40	F	Right breast	2 × 3 cm	Hard lesion	Ductal epithelial and myoepithelial cells macrophages with granulomatous and giant-cell

						reaction; AFB positive
10	29	F	Right breast	3 × 3 cm	Hard lesion	Inflammation with granulomatous reaction; AFB positive
11	30	F	Right breast	4 × 4 cm	Mobile Lump USG: fibroadenoma	Inflammation with granulomatous reaction; AFB positive
12	50	F	Right breast	2 × 2 cm	USG: fibroadenoma	Granulomatous inflammatory reaction; AFB positive

UOQ: upper outer quadrant; LOQ: lower outer quadrant; USG: ultrasonography; AFB: acid-fast bacilli.

The cytological findings demonstrated considerable variation among the lesions.

1. Granulomatous inflammation

Granulomatous inflammation was a recurring cytological feature. The recorded smears showed granulomatous aggregates, often associated with multinucleated giant cells and inflammatory cells.

2. Giant cells

Multinucleated giant cells were documented in several cases. Their presence in association with granulomatous inflammation raised the possibility of an infective granulomatous process.

3. Inflammatory background

Several cases demonstrated a predominantly inflammatory background. The inflammatory component varied between cases and was associated with granulomas, giant cells and degenerative material.

4. Macrophages and degenerated epithelial cells

Macrophages and degenerated epithelial cells were recorded in a number of cases. These findings were often accompanied by granulomatous inflammation.

5. Acid-fast bacilli

AFB positivity was recorded in the available register for the cases, providing microbiological/cytological support for tuberculosis



FIGURE 1: Giemsa stain. Shows epithelioid cell granuloma and inflammatory cells (400X)

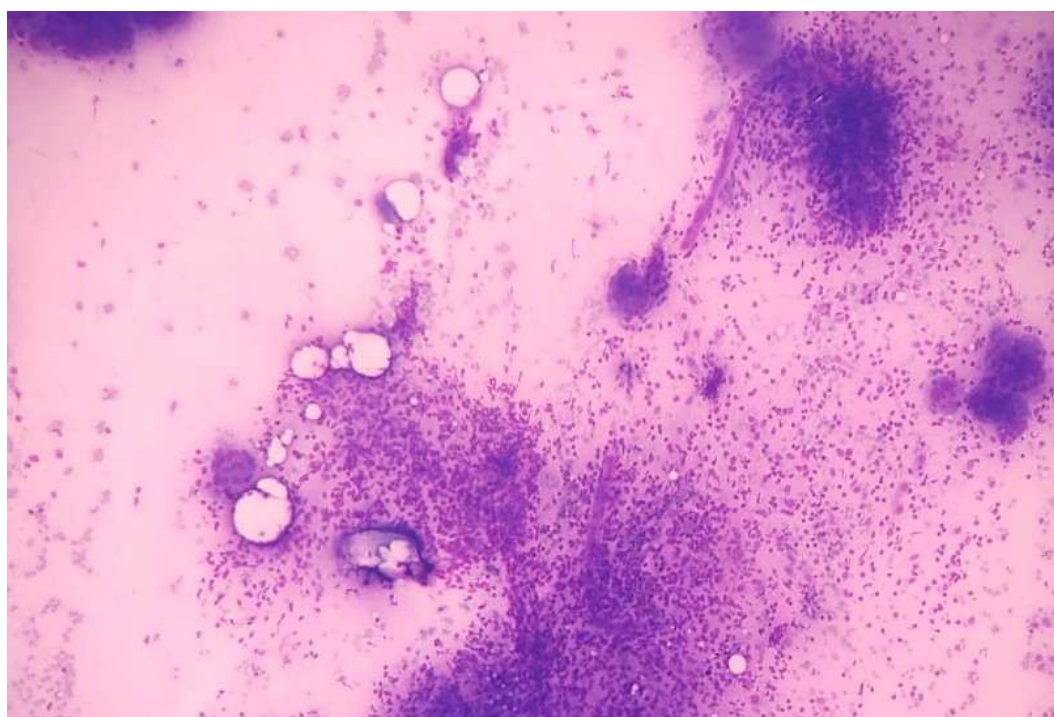


FIGURE 2: Giemsa stain. Shows multinucleated giant cells along with intact and degenerated inflammatory cells (400X)

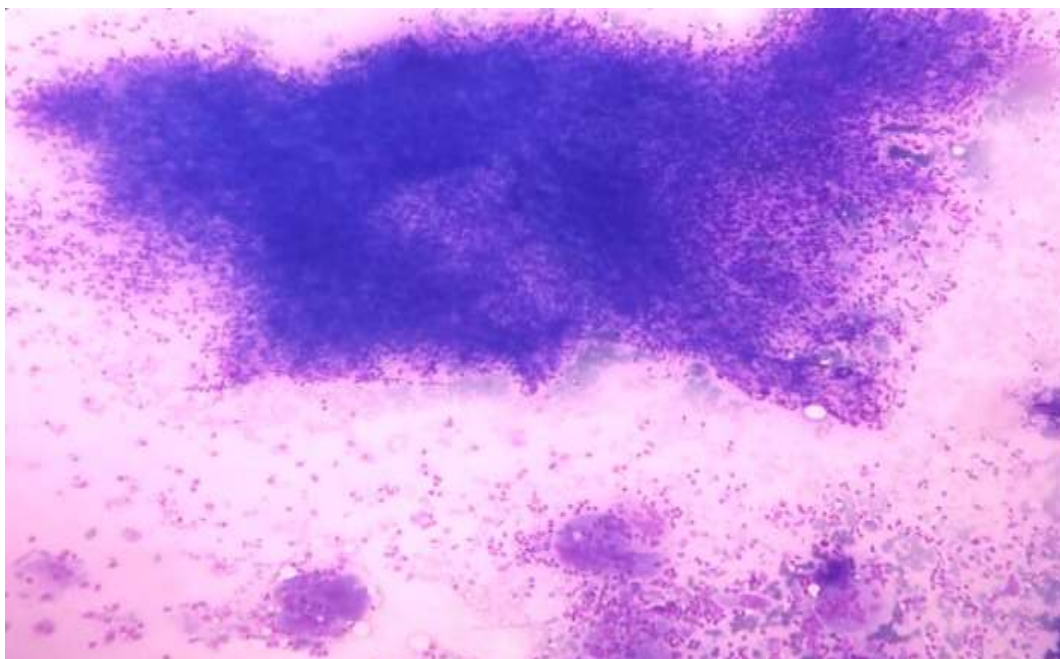


FIGURE 3: Giemsa stain. Shows granuloma and multinucleated giant cells in background of inflammatory cells

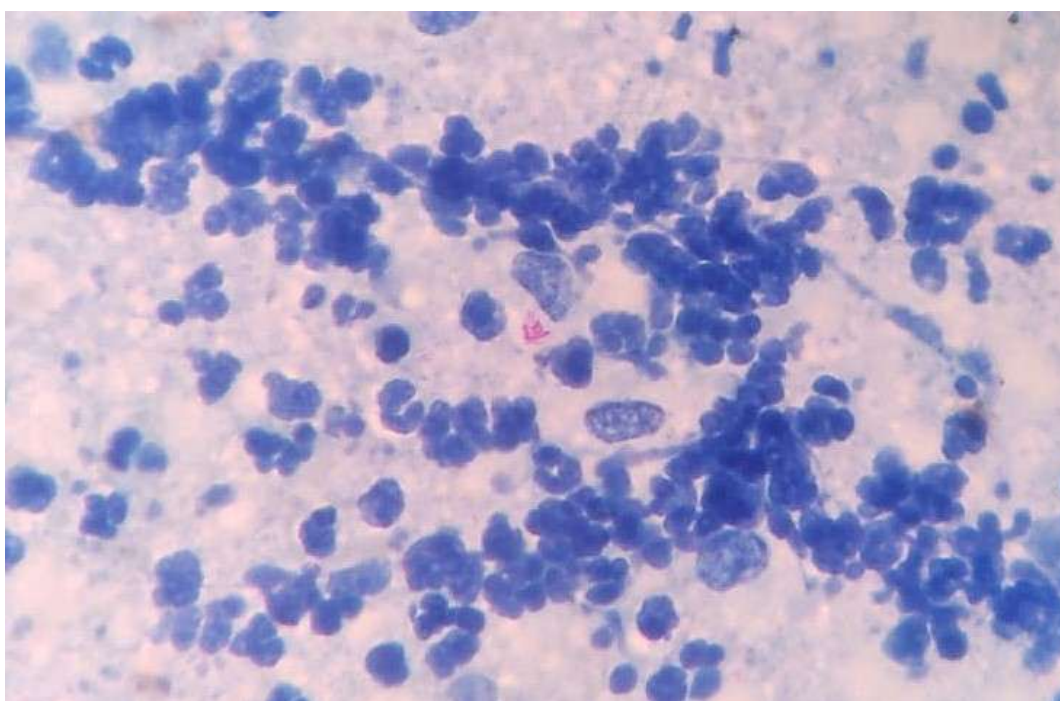


FIGURE 4: Ziehl Neelsen staining positive for AFB in a background of epithelioid histiocytes and inflammation

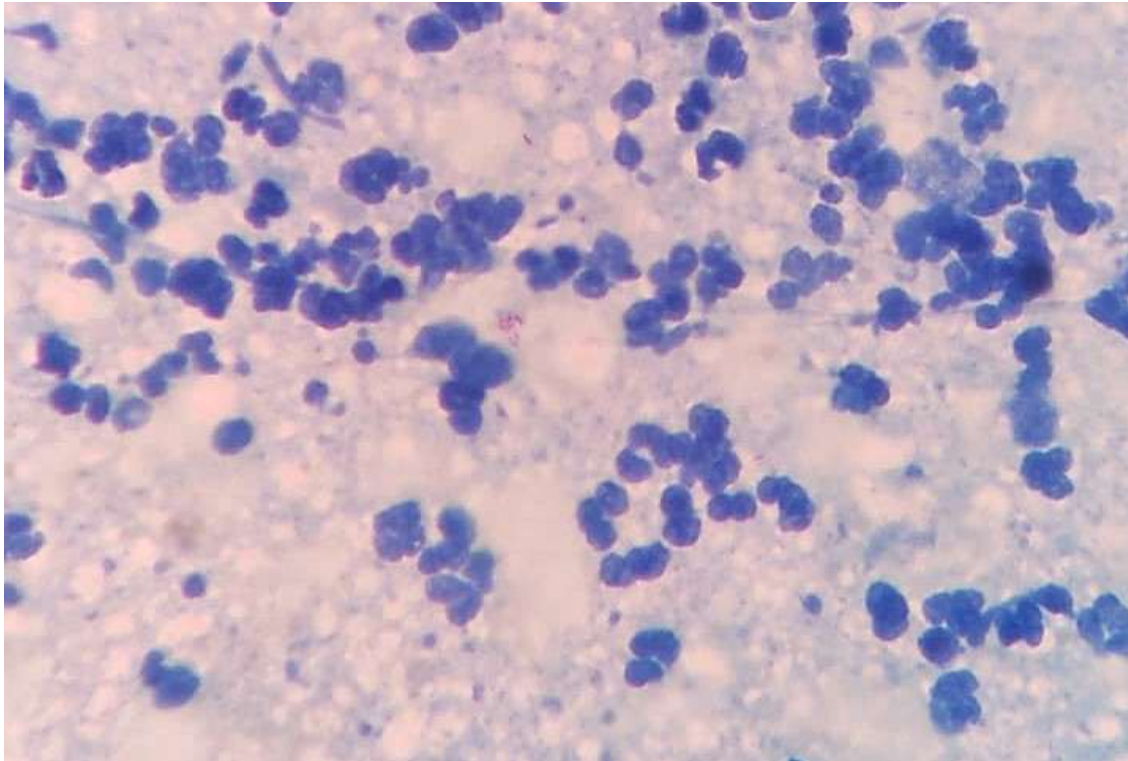


FIGURE 5: Ziehl Neelsen staining positive for AFB in a background of inflammation

DISCUSSION

Tuberculosis of the breast is uncommon but remains an important diagnostic consideration in countries where tuberculosis is prevalent. . First case of mammary TB was recorded by Sir Astley Cooper in 1829, who called it “Scrofulous swelling of the bosom.”⁸ Hamit and Ragsdale in 1982 documented only 500 cases of tuberculous mastitis, from world medical literature.⁵ Since then, case reports and reviews are being published to highlight the diagnostic dilemma of the disease.

The disease can occur at any age but is most frequently reported in young women of childbearing age, especially breastfeeding women given that the breast is more vascularized during lactation. In the present series, patients ranged from 25 to 59 years,

demonstrating that breast tuberculosis should not be restricted to a particular age group Although it is extremely rare, men can also develop granulomatous mastitis⁸

Tewari and Shukla classified mammary tuberculosis into three entities: nodular tuberculosis which occurs in the form of a localized mass that progresses slowly to reach the skin and ulcerate, the disseminated or diffuse form that takes over the full breast with communication between tubers and multiple ulcerations, and lastly, the abscessed form which takes the form of a pyogenic single abscess. The third entity is becoming more frequent¹⁰

The clinical presentation in this series was heterogeneous. Lesions were described as hard, mobile or adherent masses, and one patient had red skin with nipple retraction

and an ultrasound-described collection. Such findings can clinically and radiologically raise suspicion of malignancy or abscess. Therefore, tissue or cytological diagnosis is essential.

Farrokh et al. and Tulasi et al. have reported cases of the coexistence of carcinoma and mammary tuberculosis. Hence, it is necessary to bear in mind this possibility when dealing with granulomatous mastitis^{11,12}

FNAC is particularly useful in breast tuberculosis because it allows sampling of a lesion without requiring an incision or excision. The characteristic cytological pattern consists of epithelioid granulomas, multinucleated giant cells and necrotic material. However, the cytological appearance may vary depending on the stage of the disease and the host response.

The identification of AFB in cytological material is an important finding supporting tuberculosis. In the present series, AFB positivity was recorded in the cases, strengthening the diagnosis in conjunction with the cytological findings. One case with non contributory AFB also considered tubercular as patient presented with history of Tuberculosis

However, AFB staining has limited sensitivity in paucibacillary disease.³ Therefore, a negative AFB stain should not automatically exclude tuberculosis when the cytological picture is strongly suggestive. Depending on availability and clinical circumstances, additional investigations such as mycobacterial culture or molecular testing may be useful.

Differential diagnosis

The principal differential diagnoses include:

1. Breast carcinoma

Breast tuberculosis may produce a firm or irregular mass and can clinically mimic carcinoma on mammography or ultrasound.

¹³Careful examination for malignant epithelial cells is therefore essential. FNAC can simultaneously evaluate for malignant cells and granulomatous inflammation.

2. Granulomatous mastitis

An important diagnostic problem is the overlap between breast tuberculosis and idiopathic granulomatous mastitis. In tuberculosis-endemic areas, granulomatous inflammation of the breast should therefore prompt an appropriate search for infectious causes before a diagnosis of idiopathic granulomatous mastitis is made.¹⁴

Idiopathic granulomatous mastitis is an important differential diagnosis. It may show granulomas, giant cells, neutrophils and microabscess formation. However, infectious causes, particularly tuberculosis in endemic regions, should be excluded before labeling a lesion as idiopathic granulomatous mastitis.

One case in the present series was recorded as granulomatous mastitis, illustrating the diagnostic overlap and the importance of microbiological correlation.

3. Pyogenic abscess

Breast tuberculosis may present as an abscess-like lesion.¹⁵ A persistent or recurrent abscess, particularly one associated with granulomatous

inflammation, should raise suspicion of tuberculosis.

4. Fibroadenoma and fibrocystic lesions

Interestingly, some lesions in the present record had an initial clinical or ultrasonographic impression of fibroadenoma or fibrocystic disease. This emphasizes that radiological appearance alone may not reliably distinguish tuberculosis from benign breast lesions.¹⁶

Diagnostic Approach Suggested by This Series For a breast lesion showing granulomatous inflammation on FNAC, the following approach may be useful: Breast lump/inflammatory lesion → FNAC → identify granulomatous inflammation → perform AFB stain → correlate with clinical and radiological findings → consider microbiological/molecular confirmation where required.

In a tuberculosis-endemic setting, the presence of granulomas should prompt an active search for tuberculosis rather than immediately assigning a diagnosis of idiopathic granulomatous mastitis.

The major significance of recognizing breast tuberculosis on FNAC is the potential to avoid unnecessary surgical treatment. A lesion clinically suspicious for carcinoma may respond to antitubercular therapy when correctly diagnosed as tuberculous mastitis.

The diagnosis should nevertheless be based on adequate clinicocytological correlation. Demonstration of AFB is particularly valuable, while negative staining does not exclude tuberculosis.

LIMITATIONS

The present study has several limitations. It is a small retrospective case series based on FNAC records. Complete clinical histories, treatment details, follow-up data, microbiological culture, molecular testing and histopathological confirmation were not available in the supplied record. A prospective study incorporating detailed clinical examination, breast imaging, FNAC, Ziehl–Neelsen staining, mycobacterial culture/CBNAAT and histopathological correlation would provide stronger evidence.

CONCLUSION

Breast tuberculosis is an uncommon but important diagnostic entity that can closely mimic carcinoma, abscess, fibroadenoma and granulomatous mastitis. In this series of 12 female patients, the age range was 25–59 years and the lesions showed a broad clinical and anatomical spectrum. FNAC demonstrated variable combinations of granulomatous inflammation, giant cells, macrophages, inflammatory cells and degenerative material. AFB positivity recorded in the cases provided important evidence supporting tuberculous involvement. The study emphasizes that granulomatous inflammation in a breast lesion should prompt consideration of tuberculosis, particularly in endemic regions. FNAC combined with appropriate AFB staining can provide a rapid, minimally invasive and clinically useful diagnosis.

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