**International Journal of Medical and Pharmaceutical Research**

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Case Series

# Clinicopathological and Cytological Spectrum of Subcutaneous Mycotic Cysts in a Tertiary Care Hospital: A Case Series

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*Received: 06-12-2025*
*Accepted: 12-01-2026*
*Available online: 28-02-2026*



## ABSTRACT

**Background:** Subcutaneous mycotic cysts, including phaeomycotic cysts, are uncommon localized deep fungal lesions produced mainly by dematiaceous fungi. Their slow growth and cystic consistency often simulate lipoma, ganglion, implantation dermoid, or abscess, leading to delayed pathological recognition.
**Objectives:** To describe the demographic profile, anatomical distribution, clinical impressions, cytological findings, and histopathological features of subcutaneous mycotic cysts diagnosed in a tertiary care hospital.
**Methods:** This case series included all surgically excised lesions diagnosed as subcutaneous fungal cysts over a 15-month period. Archival records were reviewed for age, sex, site, size, duration, clinical diagnosis, and cytological impression. Haematoxylin and eosin and periodic acid-Schiff stained sections were evaluated, and available FNAC smears were reviewed.
**Results:** Twelve patients with 13 lesions were identified. The mean age was 61.8 years, and males accounted for 83.3% of patients. All lesions were located on the extremities, with the foot being the most frequent site. Lesion size ranged from 1 to 7 cm. Clinical diagnoses were varied and included lipoma, fungal cyst, implantation dermoid, abscess, and ganglion. Cytology suggested fungal abscess in 7 lesions, while others were reported as abscess or had no cytology. Histology showed cystic suppurative inflammation with fibrous capsule, granulomatous reaction, giant cells, and irregular septate fungal hyphae, highlighted by PAS stain.
**Conclusion:** Subcutaneous mycotic cysts are rare but important diagnostic mimics of benign soft-tissue lesions. Combined cytology, histopathology, and special stains provide reliable recognition.

***Keywords****: Subcutaneous mycotic cyst; phaeohyphomycosis; phaeomycotic cyst; dematiaceous fungi; FNAC; PAS stain; histopathology..*

## INTRODUCTION

Phaeohyphomycosis represents a heterogeneous group of fungal infections caused by melanized or dematiaceous fungi that appear in tissue as pigmented septate hyphae, pseudohyphae, yeast-like forms, or mixed fungal elements [1,2]. The terminology was introduced to separate these lesions from chromoblastomycosis and eumycetoma, because the tissue morphology lacks muriform bodies and organized mycotic grains. Within this broad spectrum, the subcutaneous mycotic or phaeomycotic cyst is a localized form that usually involves the deep dermis or subcutaneous tissue [3]. Although uncommon, it is clinically relevant because it often behaves as an indolent benign swelling rather than as an overt infection.

The usual portal of entry is traumatic implantation of fungi from soil, wood, thorns, or decaying vegetation into subcutaneous tissue. The resulting lesion develops slowly and is commonly painless, firm, fluctuant, or cystic. Hands,

feet, legs, knees, wrists, and other exposed extremity sites are frequent locations, reflecting the role of environmental exposure and minor unnoticed trauma [3-5]. Patients frequently present to surgical or orthopaedic services with clinical impressions such as lipoma, epidermal or implantation cyst, ganglion, abscess, foreign-body granuloma, or soft-tissue tumour. This diagnostic overlap is a major reason for under-recognition before excision [6-8].

Histopathology remains central to diagnosis, particularly when the specimen has already been fixed in formalin and fungal culture is not possible. Typical features include a cystic cavity containing pus or necroinflammatory debris, a surrounding fibrous wall, mixed acute and chronic inflammatory infiltrate, granulomatous reaction, foreign-body type giant cells, and fungal hyphae within the lumen or along the cyst wall. Haematoxylin and eosin can reveal pigmented or negatively stained septate forms, while periodic acid-Schiff and Gomori methenamine silver stains increase diagnostic confidence by highlighting fungal walls [5,9]. Fine needle aspiration cytology also has value when septate fungal forms are identified in a neutrophil-rich or giant-cell background [8,10].

Indian reports have emphasized that subcutaneous phaeohyphomycosis occurs in both immunocompetent and immunocompromised patients and that isolated cystic lesions can easily masquerade as non-mycotic surgical swellings [6-8,11-14]. However, small institutional case series remain useful because they document local diagnostic patterns, strengthen clinicopathological awareness, and demonstrate the role of cytology and routine histology in routine hospital practice. The present study was conducted with the objective of describing the demographic characteristics, lesion distribution, clinical diagnoses, cytological impressions, and histopathological findings of subcutaneous mycotic cysts diagnosed over a 15-month period in a tertiary care hospital.

## METHODOLOGY

### Study design and setting

This retrospective descriptive case series was conducted in the Department of Pathology at Dr. Yellapragada Subbarao Government Medical College and Government General Hospital, Eluru, Andhra Pradesh, India. The institution is a tertiary care teaching hospital and referral center serving Eluru district, West Godavari, and adjoining districts. It caters to both urban and rural populations and provides multidisciplinary clinical services, including general medicine, surgery, dermatology, orthopedics, pediatrics, obstetrics and gynecology, otorhinolaryngology, and intensive care. The hospital also supports undergraduate and postgraduate medical training.

The Department of Pathology provides routine diagnostic services in histopathology, cytopathology, hematology, and clinical pathology. The study was carried out in the histopathology section over a 15-month period from March 2024 to May 2025. All surgically excised subcutaneous lesions diagnosed histopathologically as mycotic cysts or phaeomycotic cysts during the study period were included. The case series was designed to document the clinicopathological profile and real-world diagnostic patterns of these uncommon lesions, which are often clinically submitted as benign soft-tissue swellings or inflammatory lesions.

**Case identification and eligibility:** The surgical pathology archives were searched for lesions showing a single large cystic cavity containing pus or necroinflammatory material, a surrounding fibrous capsule, and demonstrable fungal elements within the cavity, at its margin, or within histiocytic giant cells. Cases were included when adequate histological sections were available for review. Lesions without demonstrable fungal forms, superficial dermatophytosis, eumycetoma with grains and sinus tracts, and purely cutaneous lesions without subcutaneous cystic pathology were excluded.

**Histopathological evaluation:** Formalin-fixed, paraffin-embedded tissue sections were reviewed on haematoxylin and eosin staining. Periodic acid-Schiff stained sections were evaluated in all cases to confirm fungal morphology. The histological assessment focused on cyst architecture, nature of luminal contents, inflammatory pattern, fibrous capsule, granulomatous response, giant-cell reaction, and the presence of septate irregularly branched hyphae. Diagnostic interpretation followed accepted histopathological principles for fungal infections and subcutaneous phaeohyphomycosis [5,9].

**Cytology assessment:** Fine needle aspiration cytology slides were retrieved from cytopathology files wherever available. Smears were examined for necrotic background, neutrophils, histiocytes, foreign-body type giant cells, and fungal forms. The presence of septate fungal structures in a suppurative or granulomatous background was considered supportive of fungal abscess. Cytological diagnoses recorded in the original reports were compared with final histopathology, consistent with the documented value of FNAC in similar lesions [8,13].

**Data collection and variables:** Clinical and pathology records were reviewed for age, sex, anatomical site, lesion size, duration of swelling, clinical diagnosis, cytological diagnosis, and final histological diagnosis. One patient had two separate swellings, and both lesions were included in lesion-level analysis. Patient-level demographic variables were summarized separately from lesion-level anatomical and diagnostic variables.

**Statistical analysis:** Data were entered into a spreadsheet and analysed descriptively. Continuous variables were summarized as mean, standard deviation, median, and range as appropriate. Categorical variables were presented as numbers and percentages. No inferential statistical testing was performed because the study was a small case series intended to describe clinicopathological features rather than compare exposure groups.

**Ethical considerations:** The study used archived pathology material and anonymized record-based data. Patient identifiers were not included in the analysis

## RESULTS

A total of 12 patients with histologically confirmed subcutaneous mycotic cysts were identified during the 15-month study period. One patient had two lesions, giving a lesion-level total of 13. The mean age of the patients was 61.8 ± 9.4 years, with an age range of 45 to 81 years. Male predominance was noted, with 10 of 12 patients being males. All lesions were located on the extremities. The overall demographic and lesion profile is shown in Table 1.

**Table 1. Patient-level demographic and lesion profile**

| Variable | Finding |
|---|---|
| Number of patients | 12 |
| Number of lesions | 13 |
| Mean age, years | 61.8 ± 9.4 |
| Age range, years | 45-81 |
| Male sex | 10 (83.3%) |
| Female sex | 2 (16.7%) |
| Single lesion | 11 (91.7%) |
| Two lesions in one patient | 1 (8.3%) |
| Extremity involvement | 13/13 lesions (100.0%) |
| Mean lesion size, cm | 4.1 ± 2.4 |
| Lesion size range, cm | 1-7 |

The foot was the most common anatomical site, followed by knee, elbow, leg, and hand. Isolated lesions were also identified at the wrist and toe. The clinical impression was not uniform. Lipoma was the most frequent clinical diagnosis, followed by fungal cyst and implantation dermoid. Abscess and ganglion were also considered clinically. The anatomical distribution and clinical diagnostic categories are presented in Table 2.

**Table 2. Lesion-level anatomical distribution and clinical diagnosis**

| Variable | Number of lesions | Percentage |
|---|---|---|
| Site | | |
| Foot | 3 | 23.1 |
| Knee | 2 | 15.4 |
| Elbow | 2 | 15.4 |
| Leg | 2 | 15.4 |
| Hand | 2 | 15.4 |
| Wrist | 1 | 7.7 |
| Toe | 1 | 7.7 |
| Clinical diagnosis | | |
| Lipoma | 4 | 30.8 |
| Fungal cyst | 3 | 23.1 |
| Implantation dermoid | 3 | 23.1 |
| Abscess | 2 | 15.4 |
| Ganglion | 1 | 7.7 |

Case-wise review showed wide variation in duration, ranging from 10 days to 3 years. The largest lesions measured 7 cm and were located at the elbow, foot, and hand. Cytology was available for most lesions. Seven lesions were reported as fungal abscess on cytology, five as abscess, and one had no cytological diagnosis available. The detailed case-wise data are shown in Table 3.

**Table 3. Case-wise clinicopathological data of subcutaneous mycotic cysts**

| Case | Age/Sex | Site | Size (cm) | Duration | Clinical diagnosis | Cytological diagnosis |
|---|---|---|---|---|---|---|
| 1 | 72/M | Knee | 4 | 3 years | Lipoma | Abscess |
| 2a | 54/M | Wrist | 2 | 5 months | Lipoma | Fungal abscess |
| 2b | 54/M | Knee | 2 | 2 years | Lipoma | Fungal abscess |
| 3 | 58/F | Elbow | 7 | 2 months | Fungal cyst | Fungal abscess |

| Case | Age/Sex | Site | Size (cm) | Duration | Clinical diagnosis | Cytological diagnosis |
|---|---|---|---|---|---|---|
| 4 | 68/M | Foot | 2 | 1 month | Implantation dermoid | Abscess |
| 5 | 45/F | Foot | 7 | 10 days | Fungal cyst | Fungal abscess |
| 6 | 81/M | Foot | 2 | 2 years | Fungal cyst | Fungal abscess |
| 7 | 60/M | Leg | 6 | 1 month | Abscess | Abscess |
| 8 | 65/M | Elbow | 7 | 2 years | Lipoma | Abscess |
| 9 | 64/M | Leg | 3 | 2 years | Implantation dermoid | Not available |
| 10 | 53/M | Toe | 1 | 2 months | Ganglion | Fungal abscess |
| 11 | 63/M | Hand | 7 | 2 years | Abscess | Fungal abscess |
| 12 | 59/M | Hand | 3 | 3 months | Implantation dermoid | Abscess |

Histopathology confirmed the diagnosis in all lesions. The sections showed cystic suppurative inflammation with a fibrous wall, granulomatous reaction, giant cells, and septate irregular fungal hyphae in the cyst lumen or adjacent inflammatory tissue. PAS stain highlighted fungal hyphae in the luminal material. Representative clinical, cytological, histological, and gross findings are shown in Figures 1-4.

**Table 4. Cytological and histopathological summary**

| Diagnostic parameter | Finding |
|---|---|
| Cytology reported as fungal abscess | 7/13 lesions (53.8%) |
| Cytology reported as abscess | 5/13 lesions (38.5%) |
| Cytology not available | 1/13 lesions (7.7%) |
| Cystic suppurative cavity on histology | 13/13 lesions (100.0%) |
| Fibrous capsule with granulomatous inflammation | 13/13 lesions (100.0%) |
| Septate irregular fungal hyphae on histology | 13/13 lesions (100.0%) |
| PAS-positive fungal forms | 13/13 lesions (100.0%) |

**Figure 1. Clinical photograph showing a subcutaneous cystic swelling over the left elbow.**

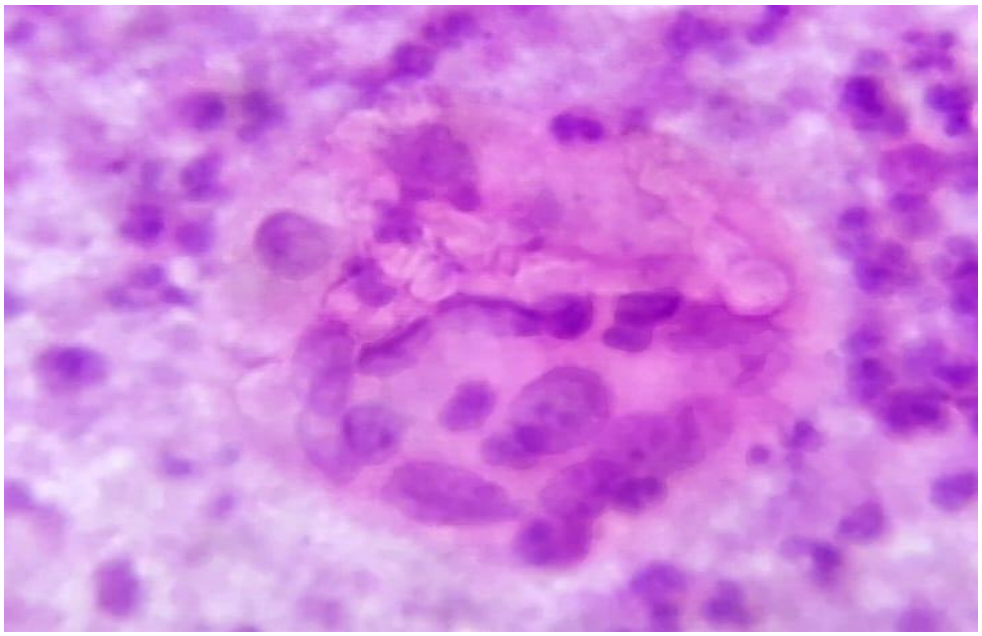

**Figure 2. FNAC smear showing septate fungal forms within a foreign-body type giant cell, with neutrophils in the background (H&E, 400X).**

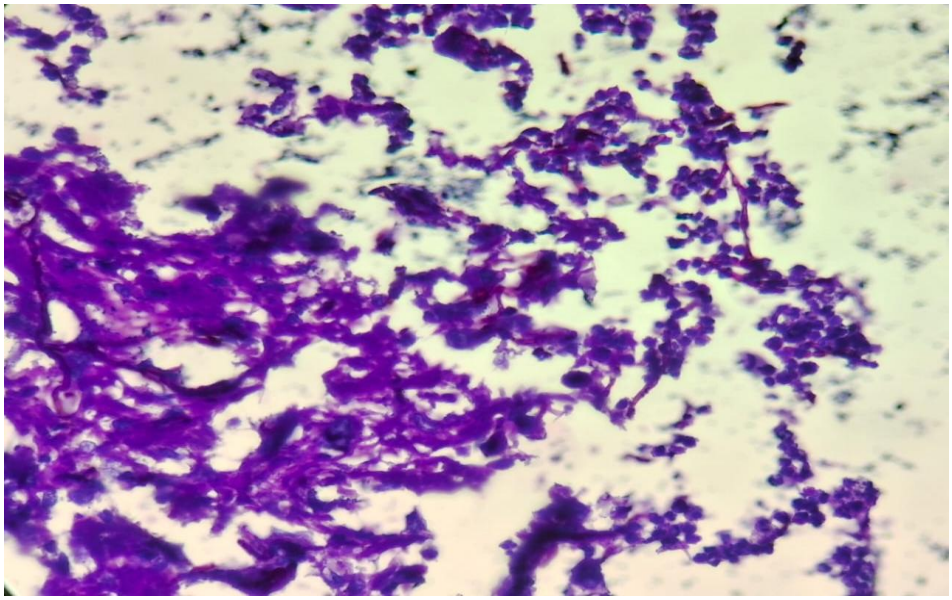

**Figure 3. PAS stain showing PAS-positive fungal hyphae in the lumen of the cyst.**


**Figure 4. Gross photograph of the excised cystic lesion showing cyst wall and pale luminal material.**

## DISCUSSION

The present case series highlights the deceptively benign clinical profile of subcutaneous mycotic cysts. Most lesions were submitted with non-specific clinical impressions such as lipoma, implantation dermoid, abscess, or ganglion. This pattern agrees with earlier descriptions of phaeomycotic cysts as localized subcutaneous swellings that are frequently recognized only after pathological examination [3,5]. The male predominance and older age distribution in this series are also in keeping with published clinicopathological reports, although the condition has been described across a broad age range and in both immunocompetent and immunocompromised hosts [6,10,14].

All lesions in the present series occurred on extremities. This observation is biologically plausible because exposed sites are more prone to minor trauma and implantation of fungi from contaminated soil, wood, or plant material. Ziefer and Connor described frequent involvement of the hands and feet, and later Indian studies also documented extremity nodules that mimicked benign surgical lesions [3,6-8]. In the current series, the foot was the commonest site, but knee, elbow, leg, wrist, toe, and hand lesions were also encountered. The lesion size ranged widely, supporting the slow and variable evolution of this localized mycotic process.

The cytological findings were useful but not uniformly diagnostic. Seven lesions were reported as fungal abscess on cytology, while five were reported simply as abscess. This difference is expected when fungal profiles are sparse, pale, fragmented, or masked by dense neutrophilic inflammation. Previous studies have emphasized that FNAC can demonstrate septate hyphae in a suppurative or granulomatous background and can guide early suspicion before excision [8,13]. The images in the present series show negatively stained septate forms within a giant-cell-rich and neutrophil-rich background, supporting the diagnostic value of careful smear screening.

Histopathology provided definitive confirmation in all lesions. The combination of a cystic suppurative cavity, fibrous capsule, granulomatous response, giant cells, and septate fungal hyphae is characteristic for subcutaneous phaeohyphomycosis in cystic form [3,5,9,11]. PAS positivity further confirmed the fungal nature of the organisms. H&E examination remains important because dematiaceous fungi can show brownish pigmentation or refractile hyphal outlines; however, special stains strengthen recognition when organisms are scant. Culture and molecular identification are ideal for species-level diagnosis, but routine histopathology retains major value when specimens are received after fixation [9,10].

This series reinforces a practical message for surgical pathology practice. Chronic cystic or nodular extremity lesions, especially those clinically labelled as lipoma, dermoid, ganglion, or abscess, deserve careful search for fungal forms. Failure to identify the organism can result in incomplete diagnosis and delayed clinical correlation. Conversely, recognition of septate hyphae in tissue permits appropriate communication with the treating clinician, enables consideration of culture in future similar cases, and supports complete excision with follow-up where clinically indicated [10-14].

## CONCLUSION

Subcutaneous mycotic cysts are uncommon localized fungal lesions that frequently resemble benign soft-tissue swellings or routine abscesses. In this 15-month case series, most patients were elderly males, and all lesions involved the extremities. Clinical impressions were diverse, with lipoma, fungal cyst, implantation dermoid, abscess, and ganglion recorded. Cytology suggested fungal abscess in several lesions, but histopathology with H&E and PAS staining confirmed the diagnosis in all cases. Recognition of cystic suppurative inflammation, granulomatous reaction, giant cells, and septate fungal hyphae is essential for accurate reporting. Routine consideration of fungal cysts in chronic extremity nodules improves clinicopathological correlation and helps guide definitive management.

### Limitations

The study was limited by small sample size, retrospective design, and dependence on archived pathology records. Fungal culture, molecular identification, immune status, treatment details, and follow-up outcomes were not available for all patients. Occupational exposure and history of trauma were incompletely documented. These factors restricted species-level interpretation and prevented assessment of recurrence or response after excision.

### Recommendations

Clinicians should include subcutaneous fungal cyst in the differential diagnosis of chronic, painless, cystic, or nodular swellings of the extremities, especially in patients with outdoor exposure or prior trauma. Aspirated material and excised tissue should be submitted for cytology, histopathology, special stains, and fungal culture whenever feasible. Pathologists should carefully search H&E sections for septate forms in suppurative granulomatous lesions and use PAS or GMS stains for confirmation. Future studies should include culture, molecular identification, antifungal susceptibility, immune-status assessment, treatment details, and follow-up to clarify species distribution and recurrence risk.

### Acknowledgement

The authors acknowledge the technical staff of the histopathology and cytopathology sections for assistance in slide processing, staining, archival retrieval, and routine diagnostic support. The authors also thank the surgical teams for providing adequate excision specimens and relevant clinical details for pathological correlation.

**Source of funding:**The study had no funding.

**Conflict of interest**: The authors declare no conflict of interest.

**Author contributions: LSB**-Concept and design of the study, results interpretation, review of literature and preparing first draft of manuscript. Statistical analysis and interpretation, revision of manuscript. **SS**-Concept and design of the study, results interpretation, review of literature and preparing first draft of manuscript, revision of manuscript. **SP-** Review of literature and preparing first draft of manuscript. Statistical analysis and interpretation. **PS-** preparing first draft of manuscript. Statistical analysis and interpretation.

**Data availability:** Data available on request

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