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Granulomatous Mastitis: Clinical, Histopathological, and Radiological Insights for Enhanced Management

Karima Mekni*[a,b], Rahma Ayadi[b,c], Khaoula Belaid[a,b], Nadia Benjemaa[b,c], Zeineb Bendhief[a,b], Aida Ayadi[b,c], Chiraz ElFekih[a,b]

[a] Department of Obstetrics and Gynecology, Mahmoud El Matri Hospital, Ariana, Tunisia
[b] Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia
[c] Department of Pathology, Abderrahman Mami Hospital, Ariana, Tunisia

* **Corresponding Author:** Karima Mekni, Department of Obstetrics and Gynecology, Mahmoud El Matri Hospital, Ariana, Tunisia; Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia, El Menzah 6, Ariana 2080, Tunisia, (+216) 23 706 133. Email: karima.mekni@fmt.utm.tn

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ABSTRACT

Background: Granulomatous mastitis (GM) is a rare benign inflammatory breast disease that can mimic breast carcinoma and infectious mastitis. Breast abscess at initial presentation may indicate a more active inflammatory phenotype and influence management. We aimed to describe histologically confirmed GM and explore features associated with baseline breast abscess.

Methods: We conducted a retrospective single-center case series using the pathology archives of Abderrahman Mami Hospital from January 1, 2004, to February 29, 2024. Data were extracted from records and supplemented by direct patient contact when necessary. Patients were compared according to breast abscess status at initial presentation.

Results: The study population comprised 42 patients, with a mean (standard deviation [SD]) age of 50.2 (11.0) years and a mean (SD) body mass index (BMI) of 25.2 (2.6). Breast abscess was present in 12 patients (28.6%). Neutrophilic infiltrates were more frequent in the abscess group than in the nonabscess group (83.3% vs 10.0%; odds ratio [OR], 45.00; 95% confidence interval [CI], 6.53–310.26; $P < .001$). Microabscesses were also associated with abscess presentation (66.7% vs 16.7%; OR, 10.00; 95% CI, 2.15–46.51; $P = .003$). In the adjusted model, higher BMI was associated with baseline abscess presentation (adjusted OR, 1.70 per 1-unit increase in BMI; 95% CI, 1.01–2.84; $P = .04$).

Conclusion: In this retrospective series, breast abscess at initial presentation was associated with a more suppurative histopathological profile and a higher BMI in the adjusted exploratory model. Prospective multicenter validation is required.

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INTRODUCTION

Granulomatous mastitis (GM), particularly idiopathic granulomatous mastitis (IGM), is a rare chronic inflammatory breast disease. It is characterized by heterogeneous clinical presentations, uncertain etiology, and substantial diagnostic and therapeutic complexity. Its clinical and radiological features may mimic breast carcinoma or infectious mastitis, making histological confirmation essential for diagnosis. Recent consensus work has emphasized the need for more standardized clinical characterization of GM and for comparisons across clinically meaningful presentation patterns. In this context, breast abscess represents a relevant clinical feature, as it reflects a complicated presentation at diagnosis and may influence imaging assessment and management strategy.[1]

The primary objective was to describe the epidemiological, clinical, radiological, and histopathological characteristics of patients with histologically confirmed GM. The secondary objective was to compare patients with and without breast abscess in order to explore clinical and histopathological features associated with abscess presentation. This comparative approach may improve our understanding of disease heterogeneity and support more standardized strategies for diagnosis and treatment in patients with GM.

METHODS

Study design and setting

This study was designed as a retrospective single-center case series of patients with histologically confirmed GM identified through the pathology archives of the Department of Pathology of Abderrahman Mami Hospital over a 20-year period, from January 1, 2004, to February 29, 2024. In addition to the primary descriptive analysis, a secondary exploratory comparative analysis was performed according to the presence or absence of breast abscess at initial presentation to explore baseline clinicopathological differences between these 2 groups.

Source population and case identification

The source population consisted of all patients with breast tissue samples diagnosed as GM in the institutional pathology archives during the study period. Cases were identified retrospectively from pathology records, and all included patients required histopathological confirmation within the same institutional pathology setting. Because not all patients had been clinically followed up at our institution, data regarding symptoms, reproductive history, hormonal exposures, and other interview-based variables were completed through direct patient contact whenever possible. Patients who could not be reached and for whom the minimum clinical dataset could not be obtained were excluded.

Temporal heterogeneity and data sources

Given the long inclusion period and retrospective design, temporal heterogeneity in clinical assessment, radiological workup, microbiological investigations, therapeutic practices, and follow-up procedures was considered. Pathological confirmation was obtained from institutional pathology archives, while clinical, radiological, and gynecological data were retrieved from available medical records and supplemented, when necessary, by direct patient interview. Radiological and therapeutic data were extracted as documented in routine care and were not assumed to be standardized across the study period.

Case definition and diagnostic criteria

Granulomatous mastitis was considered histologically confirmed when breast tissue sampling showed granulomatous inflammation centered on breast lobules, composed of epithelioid histiocytes with or without multinucleated giant cells, and with or without associated neutrophilic infiltrates or microabscesses, in the absence of malignant cells. Cases with documented breast malignancy or documented specific infectious GM were excluded.

Inclusion and exclusion criteria

Inclusion criteria were histologically confirmed GM based on breast tissue sampling and availability of minimal clinical data allowing case characterization, whether from medical records or direct patient contact. Exclusion criteria were evidence of breast malignancy, documented specific infectious GM, and inability to obtain the minimum clinical information required for analysis, particularly when the patient could not be contacted and available records were insufficient.

Definition of breast abscess and temporal framework

The framework of interest was the initial clinical presentation, defined as the first documented clinically exploitable time point before or at diagnostic workup. Breast abscess at initial presentation was defined as a localized inflammatory breast collection documented at baseline, identified clinically as a fluctuant lesion with purulent content, and/or supported by imaging when available, and/or confirmed during drainage when performed as part of initial management.

Group definition and comparability

For exploratory comparative purposes, patients were divided into 2 groups: an abscess group, including patients presenting with breast abscess at initial presentation, and a nonabscess group, including patients without breast abscess at initial presentation. Because disease duration before presentation, prior treatment outside our institution, and some severity markers were not uniformly documented, group comparisons were considered exploratory and interpreted cautiously. Potential confounding by disease stage could not be fully excluded.

Data collection and measurement

Data were extracted retrospectively from pathology, radiology, and gynecology records and supplemented, when needed, by direct patient contact. Extracted variables included demographic characteristics, reproductive history, hormonal exposures, baseline clinical presentation, subsequent abscess occurrence during disease course, and histopathological features. Data extraction was harmonized through manual review of available records and transcription into a single analysis dataset. Histopathological features were recorded individually as present/absent variables.

Operational definitions of key clinical variables

Hyperprolactinemia was defined as biologically documented hyperprolactinemia recorded in the medical file or clearly reported by the patient during direct contact. Breastfeeding complications were defined as any breastfeeding-related complication explicitly documented or clearly reported. Bilateral disease at initial presentation was defined as documented involvement of both breasts at baseline. Oral contraceptive use was recorded when documented in the history or confirmed during interview. Breastfeeding-related variables, including history, duration, time since cessation, and complications, were analyzed only when available. Histopathological features were extracted from original pathology reports and recorded as present/absent variables. Special stains were systematically performed in all cases. Radiological data were incomplete and not uniformly available; therefore, they were reported descriptively only and excluded from the main inferential analyses. Missing

radiological data were handled by available-case reporting without imputation.

Statistical analysis

Statistical analysis was performed using SPSS version 25.0 (IBM Corp). Continuous variables were summarized using means and standard deviations or medians and interquartile ranges (IQRs), as appropriate. Distributional assumptions were assessed using descriptive plots and normality testing. Categorical variables were described using counts and percentages. For exploratory comparisons between patients with and without breast abscess at initial presentation, continuous variables were compared using an unpaired *t* test when assumptions were acceptable, or the Mann-Whitney *U* test otherwise. Because of the limited sample size and sparse contingency tables, categorical variables were compared primarily using the Fisher exact test; the Pearson χ^2 test was used only when cell counts were acceptable. Statistical significance was set at $\alpha = .05$. Crude effect estimates with 95% CIs were reported in addition to *P* values. All analyses were performed on available cases without imputation. Histopathological variables were analyzed individually but interpreted cautiously because some may reflect overlapping inflammatory components rather than independent pathological constructs. An exploratory multivariable binary logistic regression model was fitted to assess whether baseline abscess presentation was associated with selected clinically relevant covariates.

RESULTS

Participant flow

The study population comprised 42 patients with analyzable data and histologically confirmed GM included in the final study sample (Figure 1).

Descriptive analysis

Demographic characteristics

The mean (standard deviation [SD]) age of the study population was 50.2 (11.0) years, with a range of 32 to 73 years. The mean (SD) body mass index (BMI) was 25.2 (2.6), with a median of 25.8 (interquartile range [IQR], 23.7–27.1) and a range of 17.3 to 29.7. Gravidity and parity had median values of 3 (IQR, 2–4) and 2 (IQR, 1–2), respectively. The observed ranges were 0 to 7 for gravidity and 0 to 4 for parity.

Clinical background

A history of breastfeeding was reported in 32 of 42 patients (76.2%). Among these 32 patients, the mean (SD) breastfeeding duration was 10.4 (3.0) months, while the mean (SD) time since breastfeeding cessation was 15.3 (10.0) years. Breastfeeding-related complications were reported in 5 of 32 patients with available information (15.6%). Among the 42 patients, oral contraceptive use was reported in 18 (42.9%), and hyperprolactinemia in 5 (11.9%).

Clinical presentation

Bilateral disease was observed in 4 cases. At presentation, a breast mass was documented in 39 of 42 patients (92.9%), mastodynia in 28 of 42 patients (66.7%), and axillary lymphadenopathy in 21 of 42 patients (50.0%). Twelve patients (28.6%) presented with an associated breast abscess (Figure 2).

Histological diagnosis was made from cores obtained by percutaneous microbiopsy in 36 of 42 cases (85.7%). In the remaining cases, diagnosis was made from tumorectomy specimens in 5 cases (11.9%) and from an excisional biopsy specimen in 1 case (2.4%) (Figure 3).

Granulomas were observed in 20 of 42 cases (47.6%), Langhans-type giant cells in 14 of 42 cases (33.3%), neutrophilic infiltrate in 13 of 42 cases (31.0%), microabscesses in 13 of 42 cases (31.0%), and eosinophilic infiltrate in 19 of 42 cases (45.2%). Interlobular inflammation was noted in 11 of 42 cases (26.2%) and was often composed of lymphocytes, plasma cells, and foamy histiocytes.

Radiological examination results were available for 10 of 42 patients (23.8%). Among the available cases, the Breast Imaging Reporting and Data System (BI-RADS) category (American College of Radiology) was as follows: category 2 (n = 2), category 4 (n = 6), category 5 (n = 1), and unspecified (n = 1). Two patients classified as BI-RADS category 4 underwent additional magnetic resonance imaging (MRI) scans.

All breast abscesses managed in our departments underwent drainage. Intraoperatively, purulent secretions were observed with or without the fetid odor typical of infectious abscesses. For cases of hyperprolactinemia, bromocriptine treatment was prescribed. All women received antibiotic therapy based on penicillin G, combined with high-dose corticosteroid treatment for 1 month, followed by a gradual tapering. For women with inflammatory signs on clinical examination or ulceration, the average response time to treatment was 10 days, ranging from 7 to 21 days.

Comparative analysis

Body mass index was associated with baseline abscess presentation (odds ratio [OR], 1.34; 95% confidence interval [CI], 1.01–1.80; $P = .05$). No significant association was observed for age (OR, 0.96 per year; 95% CI, 0.90–1.02; $P = .17$), gravidity (OR, 1.00; 95% CI, 0.61–1.62; $P > .99$), parity (OR, 0.92; 95% CI, 0.46–1.85; $P = .81$), breastfeeding duration (OR, 1.01 per month; 95% CI, 0.80–1.29; $P = .90$), or time since breastfeeding cessation (OR, 0.97 per year; 95% CI, 0.90–1.04; $P = .42$).

Neutrophilic infiltrate was significantly more frequent in the abscess group than in the nonabscess group, being observed in 10 of 12 cases (83.3%) vs 3 of 30 cases (10.0%), respectively (OR, 45.00; 95% CI, 6.53–310.26; $P < .001$). Microabscesses were also significantly associated with abscess status, occurring in 8 of 12 cases (66.7%) vs 5 of 30 cases (16.7%) (OR, 10.00; 95% CI, 2.15–46.51; $P = .003$). Langhans-type giant cells were observed in 10 of 12 cases (83.3%) in

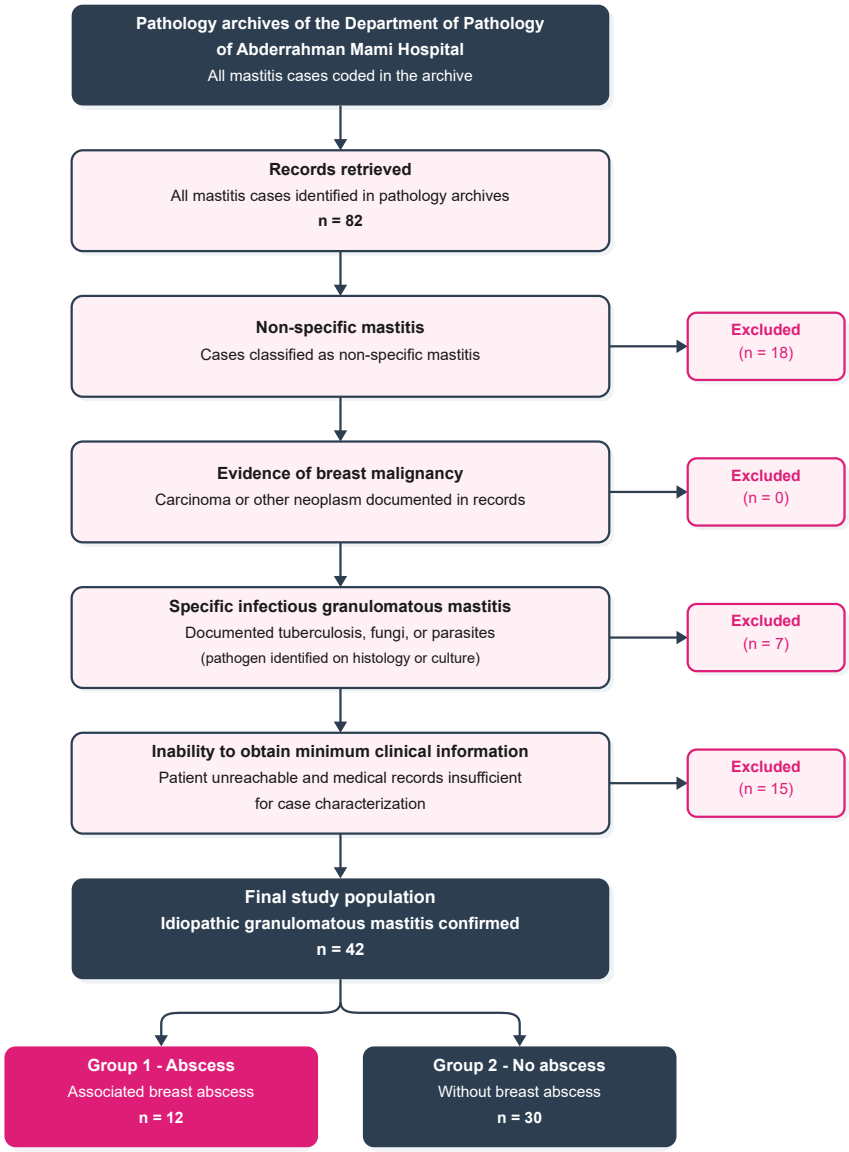


Figure 1. Flow Diagram of Patient Selection and Inclusion
The diagram illustrates the retrospective identification, exclusion criteria, and final inclusion of the 42 patients with histologically confirmed granulomatous mastitis.

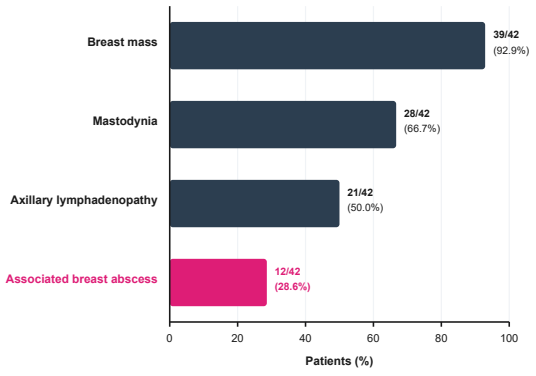


Figure 2. Distribution of Baseline Clinical Signs at Initial Presentation

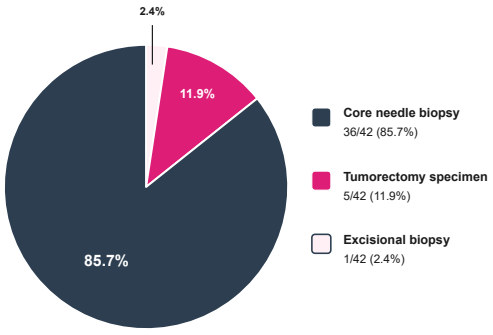


Figure 3. Tissue Sampling Methods Utilized for Diagnosis

Table 1. Factors Associated with Breast Abscess at Initial Presentation in Bivariate Analysis

Variable	Abscess group (n = 12)	Nonabscess group (n = 30)	OR	95% CI	*P* value
BMI, mean	26.7	25.5	1.34[a]	1.01–1.80	.05
Neutrophilic infiltrate, No. (%)	10 (83.3)	3 (10.0)	45.00	6.53–310.26	< .001
Microabscesses, No. (%)	8 (66.7)	5 (16.7)	10.00	2.15–46.51	.003
Langhans-type giant cells, No. (%)	10 (83.3)	4 (13.3)	32.50	5.12–206.17	< .001
Interlobular inflammation, No. (%)	9 (75.0)	2 (6.7)	42.00	6.03–292.40	< .001

Abbreviations: BMI, body mass index; CI, confidence interval; OR, odds ratio.
[a] Per 1-unit increase in BMI.

the abscess group compared with 4 of 30 cases (13.3%) in the nonabscess group (OR, 32.50; 95% CI, 5.12–206.17; $P < .001$). Interlobular inflammation was similarly more frequent among patients with abscess, being present in 9 of 12 cases (75.0%) vs 2 of 30 cases (6.7%) (OR, 42.00; 95% CI, 6.03–292.40; $P < .001$). By contrast, granulomas and eosinophilic infiltrate were not significantly associated with abscess status, with respective *P* values of .74 and .17. In the adjusted model, higher BMI was associated with baseline abscess presentation, with an adjusted OR of 1.70 per 1-unit increase in BMI (95% CI, 1.01–2.84; $P = .04$). Age, gravidity, parity, and breastfeeding history were not independently associated with baseline abscess presentation (Table 1).

DISCUSSION

Granulomatous mastitis, including its idiopathic form, remains a rare and heterogeneous inflammatory breast disease. Its rarity and uneven worldwide distribution have been emphasized in a recent scoping review, supporting the view that published cohorts may reflect differences in biological background, diagnostic awareness, referral patterns, and reporting practices.[1] Recent consensus efforts have also stressed that comparisons across studies are difficult when baseline clinical presentation, disease stage, treatment response, and recurrence are not clearly distinguished.[2,3]

The main findings of our study were that GM in our cohort was characterized by a clinical presentation dominated by breast mass and inflammatory symptoms, while abscess at initial presentation was associated with a more active suppurative histopathological profile. Twelve of 42 patients (28.6%) presented with an associated breast abscess at baseline. In the adjusted analysis, BMI was the only variable independently associated with baseline abscess presentation, whereas age, gravidity, parity, and breastfeeding history were not independently associated. Histologically, baseline abscess was strongly associated with neutrophilic infiltrates, microabscesses, Langhans-type giant cells, and interlobular inflammation. These findings suggest that abscessed forms at initial presentation may represent, or at least overlap with, a more active inflammatory phenotype of GM.

Overall, the profile of our cohort was broadly consistent with the classic clinicodemographic phenotype of GM. In the literature, IGM is typically described in parous women of reproductive age, often with a recent history of pregnancy or breastfeeding, and most commonly presents as a breast mass with variable inflammatory symptoms.[3–7] In the Iranian series by Omranipour *et al.* [5], idiopathic granulomatous lobular mastitis was also presented as a disease of young women and as a diagnostic challenge requiring close clinicopathological correlation.[5] In our cohort, however, the mean (SD) age was 50.2 (11.0) years, with a median of 49.0 years and a range of 32 to 73 years.

Breastfeeding and the postlactational context occupy a central place in the pathophysiological hypotheses of GM. In our cohort, a history of breastfeeding was reported in 32 of 42 patients (76.2%). Among women with available information, the mean (SD) breastfeeding duration was 10.4 (3.0) months, and the mean (SD) time since breastfeeding was 15.3 (10.0) years. Breastfeeding history itself was not independently associated with baseline abscess presentation in the adjusted model. Nevertheless, lactation-related mechanisms remain biologically plausible in GM. Milk stasis, ductal secretion retention, and milk extravasation into perilobular tissue have been proposed as mechanisms contributing to lobulocentric inflammation.[3,6,8,9] However, these mechanisms probably interact with immune, infectious, hormonal, and local tissue factors rather than acting as isolated causal determinants.[8,9]

Oral contraceptive use has also been cited in consensus statements and narrative reviews as a possible hormonal factor in GM.[3,6,8,9] The proposed hypothesis is that hormonal exposure may influence ductal epithelium, breast secretory activity, or local immune reactivity, thereby contributing to lobulocentric inflammation. Nevertheless, published data do not establish a robust or reproducible causal association. In our series, oral contraceptive use was reported in 18 of 42 patients (42.9%) and was not significantly associated with abscess at presentation. This result should be interpreted cautiously given the limited sample size and the fact that our analysis assessed abscessed presentation among patients with GM, rather than risk factors for developing GM itself.

Hyperprolactinemia, although uncommon in our cohort, also deserves consideration because it remains biologically plausible and is recognized in the interna-

tional consensus as an important predisposing factor, particularly in nonpregnant and nonlactating women.[3] In our series, hyperprolactinemia was reported in 5 of 42 patients (11.9%) and was not independently associated with baseline abscess presentation. Case-based literature has reported idiopathic GM in association with hyperprolactinemia and has suggested that correction of the prolactin disorder may contribute to clinical improvement in selected patients, although this level of evidence remains insufficient to infer causality at the cohort level.[10]

Clinically, GM most often presents as a breast mass, with or without pain, and may progress to inflammatory signs, abscess formation, sinus, fistula, ulceration, or skin involvement in more advanced forms.[2,3,11,12] This broad clinical spectrum explains why GM may closely mimic infectious mastitis or breast carcinoma, making clinical assessment alone insufficient and reinforcing the need for clinicopathological correlation.[5,11,12] In our cohort, breast mass was the dominant initial manifestation, documented in 39 of 42 patients (92.9%). Mastodynia was also frequent, affecting 28 of 42 patients (66.7%), and axillary lymphadenopathy was observed in 21 of 42 patients (50.0%). Bilateral involvement remained uncommon, observed in 4 patients (9.5%). These findings are broadly consistent with published series. In the Turkish series by Pala *et al.* [4], the most frequent manifestations were breast mass or abscess, tenderness, and skin changes, with bilateral disease reported in only 3.5% of cases. In our study, mastodynia and axillary lymphadenopathy should be interpreted as markers of inflammatory clinical presentation, but not as independent discriminators of abscessed presentation unless supported by group-specific estimates.

Body mass index was the only variable that remained independently associated with breast abscess at initial presentation in the multivariable model. In our cohort, each 1-unit increase in BMI was associated with a 70% increase in the odds of baseline abscess presentation (adjusted OR, 1.70; 95% CI, 1.01–2.84; $P = .04$). This finding is consistent with growing evidence suggesting a relationship between excess body weight and inflammatory breast diseases. Wei *et al.*, in a Mendelian randomization study, reported that a 1-SD increase in BMI was associated with an increased risk of mastitis (OR, 1.62; 95% CI, 1.26–2.08; $P < .001$).[14] Similarly, Yılmaz *et al.* incorporated high BMI into a recurrence risk score for severe forms of IGM, together with clinical fistula and sonographic abscess collection.[15] Other recent studies have also suggested that BMI and metabolic or immune-related factors may contribute to GM susceptibility or disease severity.[16,17] Although these studies did not specifically evaluate baseline abscess presentation as the outcome, they support the broader hypothesis that excess body weight may be linked to more active inflammatory breast disease. In the context of our retrospective design and the limited number of abscess events, however, BMI should be interpreted as an associated marker of abscessed presentation rather than as evidence of causality.

Imaging plays an essential role in the diagnostic workup of GM, but its findings are generally nonspecific. Several radiological studies and reviews have shown that mammographic, sonographic, and MRI appearances of idiopathic GM may overlap with breast carcinoma, abscess, or infectious mastitis.[18–21] Han *et al.* described mammographic and sonographic appearances that may mimic malignancy, including irregular or hypoechoic lesions and inflammatory patterns.[19] Gautier *et al.* emphasized the combined contribution of imaging and pathology in chronic GM while underlining the diagnostic difficulty created by overlap with infectious or malignant breast conditions.[18] Fazzio *et al.* similarly highlighted that idiopathic GM may be rapidly progressive and that imaging appearances can resemble cancer or infection.[20] More recent imaging reviews confirm that mammography and ultrasound findings remain insufficiently specific, making histological confirmation necessary.[21] In our study, radiological data were available for only 10 of 42 patients (23.8%) and were not sufficiently complete or standardized to support comparative inference between abscess and nonabscess groups. This limitation supports our cautious approach: clinical and radiological findings may guide biopsy or drainage, but they cannot replace histological confirmation and exclusion of specific causes.

Histopathologically, the international consensus describes granulomatous lobular mastitis as a lobulocentric lesion composed of epithelioid histiocytes, multinucleated giant cells, and mixed inflammatory infiltrates including neutrophils, lymphocytes, plasma cells, and sometimes eosinophils, with possible microabscess formation.[3] Our overall histopathological profile was broadly consistent with this framework. In our series, granulomas were observed in 20 of 42 cases (47.6%), Langhans-type giant cells in 14 of 42 cases (33.3%), neutrophilic infiltrates in 13 of 42 cases (31.0%), microabscesses in 13 of 42 cases (31.0%), eosinophilic infiltrates in 19 of 42 cases (45.2%), and interlobular inflammation in 11 of 42 cases (26.2%). Pala *et al.* reported granuloma formation in 100% of reevaluated biopsies, Langhans-type giant cells in 90.7%, microabscesses in 63.0%, interlobular inflammation in 21.5%, duct ectasia in 9.2%, and caseous necrosis in 1.5%, providing a useful descriptive comparator.[4] Benson and Dumitru also emphasized that lobulocentric noncaseating granulomas may be associated with microabscesses, supporting the interpretation of microabscess formation as part of the inflammatory histological spectrum of idiopathic GM rather than as an isolated pathological finding.[22]

In our study, abscessed presentations were associated with a more suppurative inflammatory histopathological profile. Neutrophilic infiltrates were observed in 10 of 12 patients with abscess (83.3%) vs 3 of 30 patients without abscess (10.0%) (OR, 45.00; 95% CI, 6.53–310.26; $P < .001$). Microabscesses were also significantly associated with baseline

abscess presentation, occurring in 8 of 12 patients with abscess (66.7%) vs 5 of 30 patients without abscess (16.7%) (OR, 10.00; 95% CI, 2.15–46.51; $P = .003$). Langhans-type giant cells were present in 10 of 12 patients with abscess (83.3%) compared with 4 of 30 patients without abscess (13.3%) (OR, 32.50; 95% CI, 5.12–206.17; $P < .001$). Interlobular inflammation was similarly more frequent among patients with abscess, being observed in 9 of 12 cases (75.0%) vs 2 of 30 cases (6.7%) (OR, 42.00; 95% CI, 6.03–292.40; $P < .001$). By contrast, granulomas and eosinophilic infiltrates were not significantly associated with abscess status.

These histopathological findings should not be interpreted as fully independent biological variables. Neutrophilic infiltration, microabscess formation, giant cells, and interlobular inflammation are interrelated components of the same active inflammatory process. Therefore, their association with baseline abscess presentation should be viewed as a signal of clinicopathological concordance rather than as evidence that any single histological feature independently predicts abscess formation. The absence of a specific association with eosinophilic infiltrates is also coherent with the rarity and limited diagnostic specificity of eosinophil-rich breast inflammatory lesions described in the literature.[23] Special stains and microbiological correlation remain essential when necrosis, suppuration, or atypical granulomatous patterns are present because infectious causes must be excluded before retaining the diagnosis of idiopathic GM.[3,8,9,22]

The management of idiopathic GM remains heterogeneous and should be individualized according to clinical stage, inflammatory activity, abscess formation, associated risk factors, and response to previous therapy. Current approaches range from observation in self-limited forms to antibiotics, anti-inflammatory treatment, corticosteroids, immunosuppressive therapy, repeated drainage, and surgery in selected or refractory cases.[3,11,13,24–27] In our cohort, all breast abscesses managed in our departments underwent drainage. Intraoperatively, purulent secretions were observed with or without the fetid odor typical of infectious abscesses. All women received antibiotic therapy based on penicillin G combined with high-dose corticosteroid treatment for 1 month, followed by gradual tapering. In cases of hyperprolactinemia, bromocriptine was prescribed. For women with inflammatory signs or ulceration, the average clinical response time was 10 days, ranging from 7 to 21 days.

When an abscess is present, drainage remains a central component of management, preferably under ultrasound guidance when feasible, while medical therapy may be continued according to the clinical context.[3,27] The management algorithm proposed in the international consensus supports this stage-based approach: limited masses may be followed clinically and sonographically, congestive inflammatory forms may receive corticosteroids or methotrexate, abscessed forms may require repeated ultrasound-guided aspiration, and complex refractory forms with extensive disease, sinus, fistula, or persistent wound infection may require wide local excision.[3] Medical treatment should also address associated conditions when present. Bromocriptine may be considered in cases associated with hyperprolactinemia, while corticosteroids may be used before or after surgery to reduce inflammation and improve local tissue conditions.[3,10] Intralesional corticosteroid injections, particularly triamcinolone acetonide, have also been proposed for inflammatory masses and complex skin lesions, with reported clinical efficacy.[27] Surgery should not be considered systematically as first-line treatment but remains important in persistent, extensive, recurrent, or refractory disease.[3,11,13]

Overall, our findings suggest that abscessed forms at initial presentation may represent, or at least overlap with, a more active inflammatory phenotype of GM.

Strengths and limitations

The main strengths of this study include the histopathological confirmation of all cases within the same pathology department, which strengthened diagnostic reliability and reduced the risk of clinical misclassification. In addition, the study attempted to reconstruct a comprehensive clinicopathological profile by combining pathology records, available clinical files, radiological data when present, and direct patient contact when necessary. The distinction between abscess and nonabscess groups also provided a useful exploratory framework.

However, the retrospective design limited data completeness, standardization, and temporal consistency. Over the 2-decade inclusion period, diagnostic, radiological, microbiological, therapeutic, and follow-up practices may have evolved. Moreover, direct patient contact may have introduced recall bias, and the small sample size limited statistical power and multivariable adjustment. Future prospective multicenter studies are needed to (1) implement standardized collection of clinical, radiological, microbiological, pathological, and therapeutic data; (2) differentiate initial from secondary abscesses; (3) analyze correlations among histopathological features; and (4) explore composite pathological patterns or severity scores.

CONCLUSION

Granulomatous mastitis is a rare, benign, and complex inflammatory breast disease that may clinically and radiologically mimic malignancy and may be complicated by abscess formation. In this retrospective single-center study, the exploratory comparison between patients with and without breast abscess at initial presentation suggested that baseline clinicopathological differences may exist, although these findings should be interpreted cautiously.

ETHICAL CONSIDERATIONS

This retrospective study used anonymized archival pathology and clinical data collected as part of routine care. According to the institutional policy

of Abderrahman Mami Hospital, formal ethics committee approval was not required for retrospective anonymized archival studies, and no formal ethics committee approval was obtained at the time of data collection. Informed consent was obtained from individual participants when direct patient contact was required to complete missing clinical information. Patient confidentiality was strictly preserved throughout the study, and all data were anonymized before analysis. The study was conducted in accordance with institutional requirements and the principles of the Declaration of Helsinki.

DATA AVAILABILITY

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

CONFLICT OF INTERESTS

The authors whose names are listed certify that they have no affiliations with or involvement in any organization or entity with financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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AUTHOR STATEMENT

All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

AI DISCLOSURE

AI-assisted tools were used for bibliographic formatting support. The authors reviewed and approved all manuscript content and take full responsibility for the final version.

AUTHOR CONTRIBUTIONS

Conceptualization: Karima Mekni. Methodology: Karima Mekni, Rahma Ayadi. Investigation: Khaoula Belaid, Zeineb Bendhief. Data curation: Khaoula Belaid, Zeineb Bendhief. Formal analysis: Rahma Ayadi, Nadia Benjemaa, Khaoula Belaid, Zeineb Bendhief. Writing – original draft: Karima Mekni, Khaoula Belaid, Zeineb Bendhief. Writing – review & editing: Karima Mekni, Khaoula Belaid, Zeineb Bendhief. Supervision: Aida Ayadi, Chiraz ElFekih. Validation: Aida Ayadi, Chiraz ElFekih.

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