REVIEW
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Idiopathic granulomatous mastitis: A narrative review based on the Turkish consensus classification

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ABSTRACT

Idiopathic granulomatous mastitis (IGM) is a rare, heterogeneous inflammatory breast disease lacking a universally accepted classification or a standardized management pathway. To provide a comprehensive narrative synthesis of the current literature on IGM and to contextualize the Turkish IGM clinical classification and treatment algorithm in relation to existing global evidence. A narrative literature review was conducted using PubMed, Scopus, Web of Science, and Google Scholar (2000-2025). Clinical, radiological, pathological, and therapeutic studies were examined. Previously published Turkish national consensus studies based on a modified Delphi process were incorporated into the synthesis. IGM remains diagnostically challenging due to its diverse presentations and overlap with malignancy. Existing global classification attempts are inconsistent and lack clinical practicality. The Turkish IGM clinical classification addresses these gaps by integrating lesion size, skin involvement, pregnancy/lactation categories, and extramammary findings. Treatment outcomes demonstrate the high efficacy of topical and intralesional steroids, the selective use of systemic immunosuppression, and the limited indications for surgery. The Turkish IGM classification and its associated treatment algorithm provide a practical, standardized framework that aligns with current evidence and may reduce overtreatment and mismanagement in IGM.

Keywords: Breast diseases, idiopathic granulomatous mastitis, clinical classification, treatment algorithm, consensus study, steroid therapy, immunosuppressive agents, differential diagnosis

INTRODUCTION

Idiopathic granulomatous mastitis (IGM) is a rare, benign, yet locally aggressive chronic inflammatory disease of breast tissue. First described by Kessler and Wolloch in 1972, IGM was defined as a "lesion that clinically mimics carcinoma" (1). It is most frequently observed in women of reproductive age and typically emerges in the postpartum period, particularly after breastfeeding. Since the disease can mimic both breast cancer and mastitis clinically and radiologically, the diagnosis is often challenging. Differential diagnosis is therefore crucial, as misdiagnosis may lead to unnecessary surgical interventions. Clinical manifestations observed during the course of the disease—such as breast skin erythema, painful masses, ulceration, and fistula formation—are frequently mistaken for infection or malignancy (2).

The primary method for diagnosing IGM is histopathological evaluation of tissue specimens obtained via core needle biopsy (3). It is essential to distinguish granulomatous inflammation confined to breast tissue from systemic diseases, such as tuberculosis, sarcoidosis, and bacterial or fungal infections. Typical histopathological features include non-caseating granulomas, epithelioid histiocytes, multinucleated giant cells, and neutrophilic infiltration. However, the cornerstone of diagnosis remains the exclusion of other potential granulomatous causes. In this context, IGM is essentially considered a diagnosis of exclusion (2,4).

Since its first description, efforts have been directed toward understanding the disease characteristics, clinical course, and etiopathogenesis. The efficacy of different therapeutic protocols has been debated and compared. Ongoing controversies

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regarding the etiopathogenesis of the disease, together with attempts to evaluate treatment protocols across patients with varying disease severity, have hindered the establishment of a definitive treatment strategy (5).

Currently, therapeutic approaches for IGM include observation, systemic corticosteroid therapy, intralesional steroid injections (ILSs), immunosuppressive agents, antibiotics, and surgical excision (6). In recent years, consensus reports have been developed to define clinical features, symptoms, and disease severity to better characterize the disease and to enable comparability of treatment outcomes (7). Based on these definitions, consensus statements have also been published to standardize treatment algorithms according to disease severity (8).

In this narrative review, the clinical features, radiological findings, current insights into disease pathogenesis, existing classification systems, and therapeutic approaches for IGM are synthesized in light of contemporary literature. Additionally, the Turkish national consensus studies—based on a modified Delphi methodology—are contextualized within the global evidence to highlight their clinical relevance and potential contribution to standardizing disease management. This review aims to provide clinicians with an updated and comprehensive overview of the diagnostic challenges, classification frameworks, and treatment strategies associated with IGM.

MATERIAL and METHODS

This comprehensive narrative review aimed to synthesize current knowledge on the etiopathogenesis, clinical presentation, diagnostic challenges, classification systems, and treatment approaches of IGM. Accordingly, the goal was not to perform a systematic data extraction, but rather to integrate multidisciplinary evidence and to contextualize the Turkish IGM clinical classification within the broader international literature.

Literature Search Strategy

A non-systematic literature search was performed in PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. The search covered articles published between 2000 and August 2025. Foundational articles published before 2000 were also considered when identified in reference lists. Search terms included:

"IGM", "granulomatous lobular mastitis", "cystic neutrophilic granulomatous mastitis", "classification", "treatment", "steroid therapy", "immunosuppression", "Delphi", "consensus".

Reference lists of key publications and consensus reports were also screened to identify additional relevant literature.

Inclusion Scope

The review included clinical studies, reviews, classification proposals, consensus reports, imaging studies, and treatment-focused publications. Case reports were used selectively when they contributed important context (e.g., rare presentations or diagnostic challenges).

Consensus Methodology Integration

The Turkish IGM clinical classification and treatment algorithm was derived from previously published Turkish national consensus studies, which were developed using a modified Delphi process (7,8). To enhance transparency, a subsection detailing the number of participants, voting rounds, consensus thresholds, and methodological framework has been added. These consensus outputs were then integrated into the narrative synthesis to discuss their relevance and position in the global literature.

Synthesis Approach

Given the heterogeneity of studies and the conceptual nature of IGM classifications, data were synthesized descriptively rather than meta-analytically. Findings were organized thematically under etiopathogenesis, pathology, diagnosis, radiology, existing classification systems, treatment modalities, and the consensus-based clinical classification (Turkish model).

Etiology

The etiopathogenesis of IGM has not yet been fully elucidated. The designation "idiopathic" underscores the fact that its underlying cause remains uncertain. However, recent clinical and molecular studies have identified several factors that may play a role in the development of the disease. Among these, hormonal, infectious, autoimmune, and genetic mechanisms have been highlighted (2,6,9). It is thought that these multiple factors may act either concurrently or sequentially.

Hormonal influences are among the most frequently discussed aspects of IGM etiology. The predominance of IGM in women of reproductive age and in the postpartum period suggests that changes in prolactin and estrogen levels may trigger an inflammatory response in breast tissue (10). Galactostasis (milk stasis) is considered one of the strongest predisposing factors for IGM (11). Epithelial damage during the postpartum period and breastfeeding-related trauma may contribute to autoimmune inflammatory responses by triggering them.

Among infectious agents, *Corynebacterium kroppenstedtii* has received the most attention (12). Isolation of this bacterium from some cultures and its association with lobulocentric granulomatous inflammation suggest that infectious triggers may act as initiators or perpetuators of the disease. However, culture results are negative in most IGM cases, indicating that infection may not always be the primary cause. In countries where tuberculosis is endemic, some cases diagnosed as IGM may actually represent misclassified tuberculous mastitis (TM).

Autoimmune mechanisms are considered central to the etiopathogenesis of IGM and constitute a major etiological factor. Elevated levels of certain immunological parameters associated with the disease, the presence of granulomas, and immune cell infiltration, particularly a T-cell–mediated immune response, all support this hypothesis (13). The clinical efficacy of immunosuppressive therapies (e.g., methotrexate, azathioprine) in some patients further reinforces this concept (14). The coexistence of IGM with rheumatologic diseases further supports a link with systemic autoimmunity (14).

Although less extensively studied, genetic and environmental factors may also contribute, as suggested by geographic clustering and familial cases (15). The higher frequency of IGM reported in certain regions, including Türkiye, suggests potential roles for environmental triggers and genetic susceptibility.

IGM is a multifactorial disease. Hormonal imbalances, abnormal inflammatory responses to microorganisms, autoimmunity, and genetic or environmental influences may all contribute to its development. The varying predominance of these factors in different patients likely accounts for the clinical heterogeneity of the disease.

Pathology and Diagnosis

The histopathological findings in IGM are non-specific. The presence of granulomas with acute or chronic inflammation in the breast parenchyma is sufficient for a diagnosis of granulomatous mastitis; however, this represents a descriptive diagnosis and does not define the etiology. Therefore, when granulomatous mastitis is identified in biopsy specimens, histopathological features that may provide etiopathological clues should be evaluated in correlation with the clinical findings. Given the wide range of potential causes of granulomatous mastitis, diagnostic uncertainty may negatively affect treatment success (16). Specifically regarding IGM, the patient's age group (reproductive period and history of pregnancy/lactation) and the region of the breast predominantly affected by the lesion (breast parenchyma outside the nipple-areola complex) are helpful in the differential diagnosis (17). The presence or absence of necrosis is important in distinguishing IGM from tuberculosis. Rare infectious causes such as fungal infections (e.g., histoplasmosis), should be carefully excluded (18).

To ensure that the inflammatory process does not mask an underlying neoplastic condition, malignancy should, if necessary, be excluded using immunohistochemical studies (cytokeratin staining) (19). Other granulomatous conditions, including sarcoidosis, vasculitis, and foreign body reactions, should also be considered. As a diagnosis of exclusion, IGM is often made on the basis of compatible clinical and histopathological findings. Typically, inflammation with epithelioid granulomas is centered on terminal duct lobular units, forming a ductocentric pattern.

At this stage, immunoglobulin (Ig)G4 immunohistochemistry may be performed on plasma cells. If positive results are obtained, serum IgG4 levels can be measured to evaluate possible IgG4-related disease (20).

Cystic neutrophilic granulomatous mastitis is considered a special histopathological subtype of IGM. In complicated cases with abscess formation, bacteria from skin flora may contribute to disease development.

Chief among these are *Corynebacterium* species, which, due to their lipophilic nature, have been shown to form small cystic spaces that are surrounded by neutrophils within the breast parenchyma containing adipose tissue (21). These organisms can be identified using appropriate histochemical stains and should be actively sought, although the possibility of contamination should also be considered.

Gram-stain and Grocott's methenamine silver stain can also be used to distinguish these bacteria (22). Because cystic foci may not be present in all biopsy sections, serial sectioning may be required. The demonstration of bacteria in biopsy specimens may assist clinicians in selecting appropriate antibiotic therapy and determining treatment duration.

Differential Diagnosis

IGM may present with painful, firm breast masses, abscess formation, skin erythema and edema, and fistula formation. Its clinical and radiological features are often non-specific and may mimic benign conditions such as fibrocystic changes or abscesses as well as malignancy. Therefore, before diagnosing IGM, all other possible causes of granulomatous inflammation, especially breast carcinoma, must be excluded (23).

Bacterial Mastitis

IGM may be confused with infectious processes such as puerperal (lactation-related) mastitis or breast abscess, particularly in lactating women. Acute bacterial mastitis is characterized by fever, severe pain, and systemic signs of infection and usually responds rapidly to antibiotics. In contrast, IGM has a more chronic course and does not respond to standard antibiotic therapy since lesions are usually sterile and no significant pathogens are identified (24).

Radiologically, infectious mastitis and abscess, as well as IGM may appear as irregularly marginated, heterogeneous breast masses. On ultrasound, complex cystic or abscess-like lesions may be observed in both conditions.

Therefore, when clinical and imaging findings are similar, needle aspiration or incision and drainage should be performed for culture. The presence of pyogenic bacteria

should be investigated by culture and Gram-staining to exclude bacterial mastitis. In most IGM lesions, bacterial growth is not detected, although secondary infection may occasionally occur. In such cases, antibiotics may be required, but routine antibiotic therapy alone does not cure IGM.

Given recent reports increasingly identifying *Corynebacterium* species in IGM specimens, this bacterial infection should also be excluded.

TM

Among infectious causes of granulomatous mastitis, TM is one of the most important and should be considered, especially in endemic regions or among at-risk populations. TM may present with a slowly enlarging firm breast mass, skin retraction or ulceration, chronic sinus tracts, and axillary lymphadenopathy. Radiologically, TM may mimic inflammatory breast cancer, presenting as irregular masses or multiloculated abscesses, and axillary lymphadenopathy is more common.

Ziehl-Neelsen staining should be performed on tissue samples to detect acid-fast *Bacilli*, and culture or polymerase chain reaction (PCR) should be performed to exclude mycobacterial infection (25). Misdiagnosis may lead to inappropriate corticosteroid use or unnecessary antituberculous therapy.

Therefore, in every case of granulomatous mastitis, screening for tuberculosis with purified protein derivative or interferon gamma release assay tests, chest X-ray, and mycobacterial culture/PCR is mandatory.

Fungal and Other Infectious Agents

Although fungal infections of the breast are rare, in immunosuppressed individuals or in endemic areas, fungi that cause histoplasmosis or blastomycosis can cause granulomatous mastitis. Other reported infectious causes include *Cryptococcus* species, *Nocardia*, and *Actinomyces*. *Bartonella henselae* infection (cat-scratch disease) may rarely present as granulomatous inflammation of the breast accompanied by axillary lymphadenopathy. Special stains [periodic acid Schiff, Grocott (or Gomori) methenamine silver] and cultures should be performed when clinically indicated.

Ultimately, even if the clinical picture suggests IGM, a diagnosis of "idiopathic" IGM should not be made without first demonstrating the absence of a specific infectious agent by comprehensive microbiological investigation.

Sarcoidosis

Sarcoidosis may rarely involve the breast, creating a clinical picture almost indistinguishable from IGM. Non-caseating granulomas also form in sarcoidosis, and histologically, these are very similar to those of IGM. Sarcoidosis generally involves multiple systems, particularly the lungs and mediastinal lymph nodes.

Therefore, if sarcoidosis is suspected when granulomatous mastitis is detected in the breast, chest radiography or computed tomography, measurement of serum angiotensin converting enzyme levels, and examination for dermatologic or ocular findings should be performed. Cases usually present with concurrent systemic findings. If breast involvement by sarcoidosis is confirmed, treatment may differ from that for IGM (e.g., longer-term, low-dose steroids, additional immunosuppressive therapy).

Wegener's Granulomatosis and Other Vasculitic Diseases

Granulomatosis with polyangiitis (Wegener's granulomatosis) is a necrotizing granulomatous disease that primarily affects the lungs and kidneys, but may rarely involve the breast and mimic IGM (26). Systemic findings and c-ANCA positivity support the diagnosis. This should especially be considered in patients with a known history of vasculitis.

Other chronic inflammatory breast conditions should also be considered in the differential diagnosis of IGM (27). Periductal mastitis, particularly in women who smoke, is a chronic breast disease that develops due to obstruction and inflammation of periareolar milk ducts. Clinically, periductal mastitis may resemble subareolar IGM. However, in periductal mastitis, histology shows dense infiltration of plasma cells and lymphocytes around dilated ducts rather than granuloma formation, with no caseation.

Foreign body reactions can also cause granulomatous inflammation in the breast tissue. For example, granulomatous reactions with multinucleated giant cells may occur around silicone implants or injected materials (paraffin, biopolymers, etc.). These situations are usually clarified by the patient's history. Crohn's disease may rarely present as granulomatous mastitis, an extraintestinal manifestation.

Therefore, in patients with a history of autoimmune disease, granulomas in the breast should be considered potentially indicative of systemic disease.

Differential Diagnosis with Breast Cancer

One of the most critical differential diagnoses of IGM is breast cancer. Granulomatous mastitis can mimic inflammatory breast cancer in both clinical presentation and imaging findings. Patients may present with breast induration, erythema, and edema. Similarly, inflammatory breast cancer presents with painless breast induration, erythema, and a peau d'orange appearance. Nipple retraction and axillary lymphadenopathy may occur in both conditions.

In cases of granulomatous mastitis, mammography may reveal areas of increased density with irregular margins or

asymmetry, and ultrasonography (USG) may show spiculated, heterogeneous, hypoechoic lesions resembling malignant masses. Indeed, many IGM cases are initially reported as BI-RADS 4-5 based on imaging (28). Therefore, tissue sampling is mandatory for a definitive diagnosis.

In summary, IGM is a breast disease that is difficult to diagnose and can mimic many other conditions. Differential diagnosis must always include infectious mastitis (particularly tuberculosis), malignancies, sarcoidosis, and other rare granulomatous disorders. A definitive diagnosis is based on demonstration of granulomatous inflammation on biopsy and exclusion of other causes; multidisciplinary evaluation is essential to guide appropriate treatment and avoid unnecessary interventions.

Radiological Evaluation

Although radiological imaging plays an important role in the diagnostic process of the disease, the findings often resemble malignancy. Therefore, careful interpretation of radiological findings and histopathological confirmation are crucial for accurate diagnosis (29).

The imaging modalities and their findings can be briefly summarized as follows:

1. USG: Is the most frequently used first-line imaging modality for IGM. Typical findings include heterogeneous, hypoechoic, irregularly marginated masses (Figure 1A), tubular extensions, abscesses or fistula tracts (Figures 1B-D), and perilesional hyperemia on Doppler USG. However, USG may be insufficient to exclude malignancy, and biopsy is often required.

2. Mammography: Because IGM often occurs in young women, mammographic evaluation is of limited utility. Possible findings include an asymmetric increase in density, parenchymal distortion, and skin thickening, whereas microcalcifications are usually absent. This absence may serve as a clue in the differential diagnosis favoring malignancy (Figure 2).

3. Magnetic resonance imaging (MRI): Is particularly useful for detecting diffuse involvement, complicated abscesses, and fistula tracts. Findings include hypointense signals on T1-weighted images, hyperintense signals on T2-weighted images, peripheral rim enhancement of abscesses, and diffuse edema and skin thickening (Figure 3). MRI is preferred in cases of suspected malignancy and in patients with marked edema to identify the most appropriate biopsy site.

Radiological differential diagnosis: Granulomatous mastitis may mimic breast abscess, idiopathic mastitis, TM, and, particularly, inflammatory breast cancer. The absence of microcalcifications, the presence of fistula or abscess formation, and the patient's age can serve as useful diagnostic clues. However, a definitive diagnosis must be established by histopathological examination. For this reason, a tru-cut biopsy under USG guidance is generally required.

In conclusion, radiological evaluation plays a critical role in the diagnostic process of IGM but is not sufficient on its own. While USG is the first-line modality, it should be supplemented with mammography and MRI when necessary (30).

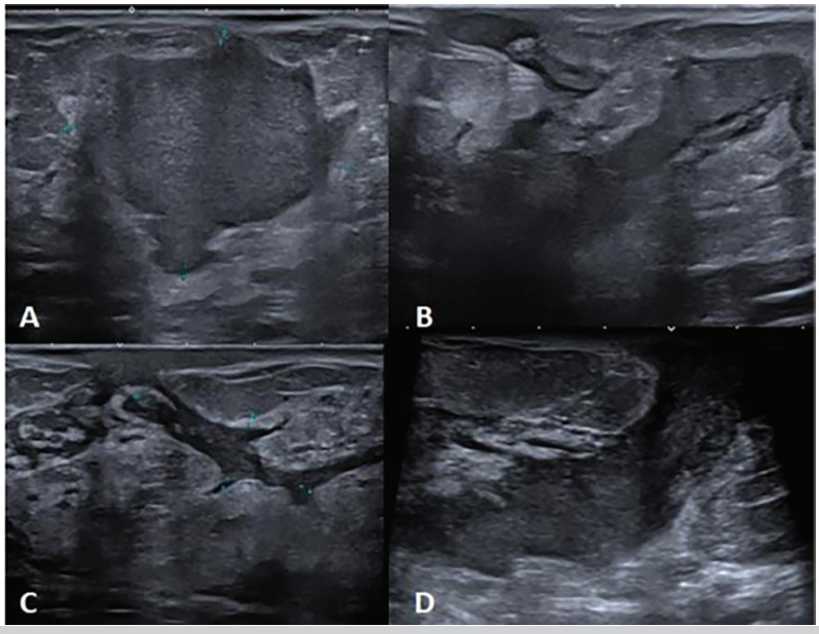

Figure 1. Sonographic findings of IGM; irregularly marginated mass (A), abscess and fistulous tracts extending to the skin (B-D).
IGM: Idiopathic granulomatous mastitis

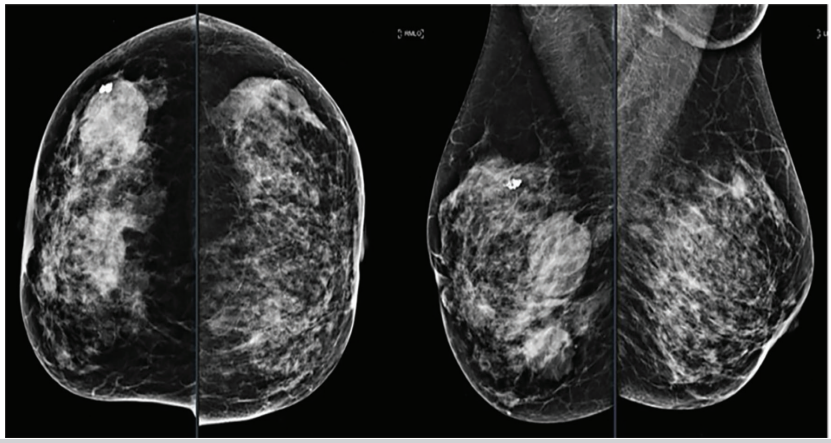

Figure 2. Mammography of a patient diagnosed with IGM in the right breast showed skin thickening in the right periareolar region, a mass-like opacity consistent with an abscess in the upper outer quadrant, and increased density in the right retroareolar area compared with the left breast.

IGM: Idiopathic granulomatous mastitis

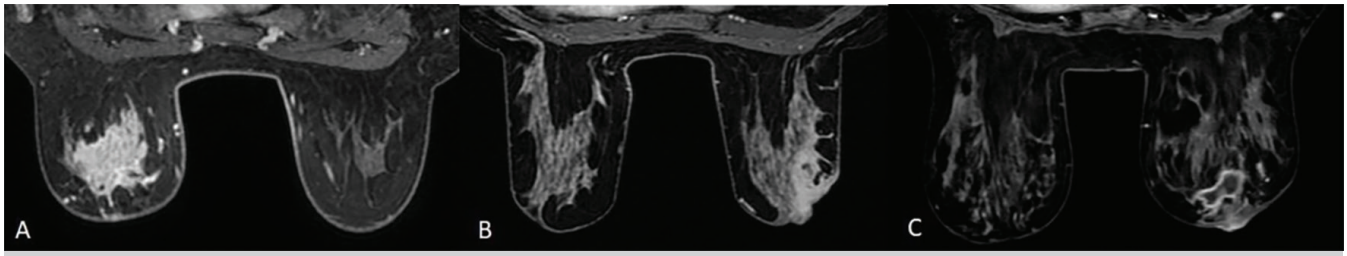

Figure 3. MRI findings in different patients with IGM; diffuse non-mass enhancement (A), segmental non-mass enhancement extending toward the nipple (B), and rim-shaped enhancement (C).

IGM: Idiopathic granulomatous mastitis, MRI: Magnetic resonance imaging

Definitions and Classifications

The disease exhibits highly heterogeneous clinical presentations. In addition, clinical assessment presents practical difficulties, and the literature lacks uniform terminology for describing the disease. A common terminology for defining this disease was first established (7). This is extremely valuable, as new definitions have provided some standardization in the literature. Common terminology for breast disease is presented in Table 1 (7).

Such a level of uniformity in definitions had not been achieved previously. This terminological framework can facilitate communication among clinicians, aid understanding of the work conducted in IGM, and promote homogeneity across studies. In this regard, this list of definitions fills an important gap.

There is a need for a widely accepted classification system for this disease. Because of its heterogeneous clinical presentation, classification is difficult. Several studies have been published in this context, but no universally accepted classification is currently used. An IGM clinical classification should include a physical examination and imaging methods. Such a classification should be concise, comprehensive, and simple. Furthermore, it should provide a common academic language, offer prognostic information, and guide treatment. In this regard, several studies have been published. The first classification in Türkiye was published by Irkorucu (31). However, this study was complex and not widely accepted. Scoring systems have

Table 1. Common terminological definitions for IGM

Terminology	Definitions
Breast lesion	Presence of mass, erythema, collection, or abscess in the breast
Sinus	Presence of discharge or fistula
Ulcer	Wounds or erosions in the breast
Healing	Resolution of the lesion confirmed by physical examination and imaging (MG, US, magnetic resonance imaging)
Recurrence	Reappearance of a previously healed lesion, independent of time
Resistance	Resistance to systemic treatment modalities and evidence of progression
Multifocality	Presence of more than one lesion in the breast
Bilaterality	Presence of lesions in both breasts
Additional findings	Presence of extra-mammary systemic findings (e.g., arthritis, erythema nodosum)

IGM: Idiopathic granulomatous mastitis, US: Ultrasound, MG: Mammography.

also been developed to describe the complex nature of the disease. In a study published by Yılmaz et al. (32), patients' clinical presentations were scored by assigning points to specific clinical findings; the total score was used to determine an IGM disease score. However, due to the complexity and subjectivity of the calculations, this system has not been widely adopted (32).

A classification proposal from Iran, by Kaviani et al. (33), has also been published. This study suggested a classification of IGM into mild, moderate, and severe categories on a pathophysiological basis that includes inflammatory processes. However, the classification did not address cutaneous findings or extramammary lesions. In addition, abscess and sinus formation were evaluated together. This classification has not been widely used. Another study by Yaghan et al. (34) classified IGM lesions in the breast into types A, B, C, and D. However, extramammary lesions were not described, and lesion size was not specified in some parts of the classification. Due to these limitations, this system has not gained wide acceptance in the literature.

Researchers from China published an international consensus on IGM (6). In this study, most clinical conditions, including lobular granulomatous mastitis, were assessed collectively. However, no clear explanation was provided for lesions smaller than 5 cm. Furthermore, recurrent cases were not included; systemic findings were excluded from the classification; and pregnant and lactating patients were not considered. All these efforts demonstrate that, although attempts have been made to classify IGM, no system has yet been standardized for widespread use.

The Turkish IGM clinical classification has been accepted by consensus and meets the need for clinical classification in this field. This clinical classification was developed based on findings from physical examination and radiological imaging (7). It was accepted with a 94% approval rate via digital voting by experienced breast surgeons and radiologists in Türkiye. The Turkish IGM clinical classification identified in this study is shown in Table 2 (7).

Table 2. Idiopathic granulomatous mastitis-Turkish clinical classification

Type	Definition
Type 1	Lesion ≤2 cm and/or collection
Type 2	Findings of type 2 accompanied by skin inflammation or lesion >2 cm and/or collection
Type 3	Lesion accompanied by skin ulceration and/or presence of systemic findings of any type (e.g., erythema nodosum, polyarthritis, etc.) and/or multiple foci
Type 4	Recurrent and/or treatment-resistant cases
Pregnancy/lactation	Patients who are pregnant or breastfeeding

In the Turkish IGM clinical classification, breast lesions are divided into four categories. In addition, it includes pregnant or lactating patients. This original study addresses many of the shortcomings of previously published classifications. The Turkish clinical classification has been considered comprehensive, memorable, and practical, and suitable for use in outpatient settings. Moreover, it provides guidance for treatment. We believe it will contribute to establishing a common language in the literature.

Treatment

Observation ± drainage: IGM is a self-limiting disease, with up to 50% of patients achieving complete remission within 2-24 months without treatment (35). Studies have shown that milder cases with small lesions (1-2 cm) often resolve spontaneously under close observation (36). Therefore, in asymptomatic Type 1 disease and mild Type 2 disease, watchful waiting is a reasonable approach after excluding other causes. In cases of abscess formation, superficial abscesses should be drained with as small an incision as possible, as delayed wound healing is common in this condition. Alternatively, large-core needle aspiration can be used. Deep abscesses are best managed with ultrasound-guided percutaneous drainage to expedite healing.

Topical steroids were first identified as an effective treatment option for IGM in 2011 (37). Retrospective studies reported high remission rates (100%) and acceptable recurrence rates (10.7-18.2%) with the use of 0.125% prednisolone ointment (38). Later, the first prospective randomized study in this field demonstrated that topical steroids were as efficacious as systemic therapies [complete response (CR), 83% vs. 85%], although treatment duration was longer (mean 5.5 vs. 3 months), as previously shown by Çetin et al. (5). Importantly, topical steroids can be safely used in pregnant and breastfeeding women, making them a valuable first-line treatment option for these special populations. In addition, they are recommended as monotherapy for Type 2 disease or in combination with ILSs (8). In recurrent disease, as well as in Type 3 and Type 4 cases where systemic therapy is either contraindicated or refused by the patient, topical steroids may be a suitable alternative. For optimal efficacy, an ointment formulation must be used to ensure deep dermal penetration. Moreover, to prevent the medication from being absorbed by clothing—which would significantly reduce its local effect—a barrier layer (such as plastic wrap) should be applied over the treated area. The absence of systemic side effects and improved patient compliance further support their roles as important therapeutic options for appropriately selected patients.

Intraparenchymal/ILS: Has demonstrated promising efficacy in the treatment of IGM, with favorable outcomes reported in Turkish studies (39,40). A 2020 study reported CR in 90% and partial response in 10% of treatment-naïve patients, with no reported side effects, following administration of depo-medrol

(40 mg/mL methylprednisolone acetate) over 2-7 sessions at 2-3-week intervals (9). Similarly, a 2021 study found that ILS combined with topical steroids was superior to systemic steroids, yielding higher CR rates (93.5% vs. 71.9%) and significantly lower recurrence rates (8.7% vs. 46.9%) (8). Given its high efficacy, low recurrence rates, and favorable safety profile, ILS is recommended as a first-line treatment for patients with Type 2 disease and as an alternative for patients with Type 1 disease and for pregnant and breastfeeding patients (8). In selected resistant or recurrent cases, the combination of ILS and oral steroids may provide greater therapeutic benefit.

Surgical treatment was the primary option for managing IGM before 1980. After a 1980 study demonstrated the efficacy of steroids, the frequency of surgical interventions decreased and medical approaches became more prominent. In recent years, some breast surgeons have reconsidered surgical treatment as a primary option. Nevertheless, limited surgical excisions have been associated with recurrence rates as high as 23-50%, thereby restricting the effectiveness of surgery (41). Achieving complete remission often requires repeated surgical interventions, complicating patient management. On the other hand, comprehensive resections utilizing oncoplastic techniques or mastectomy combined with simultaneous reconstruction have been shown to reduce recurrence rates to as low as 5% (42). While rapid recovery and low recurrence rates offer advantages over prolonged conservative treatments, these approaches are associated with higher costs and loss of lactational function in women of reproductive age. Furthermore, such aggressive interventions may be considered excessive for a benign, self-limiting disease. Therefore, in selected cases of IGM, surgical treatment should be considered in combination with other therapeutic options.

Antibiotics: Although they can be administered based on bacterial culture results and drug-susceptibility testing, their role in treating IGM is limited. Consequently, antibiotics are not considered a first-line treatment option for IGM. In clinical practice, many patients at tertiary care centers in Türkiye report receiving antibiotic therapy prior to referral, often without significant improvement (32,40). This lack of response further underscores the limited utility of antibiotics in managing IGM and highlights the importance of accurate diagnosis and appropriate treatment strategies tailored to the idiopathic nature of the disease.

Supportive therapies: Supportive therapies play a crucial role in the management of IGM, particularly in enhancing patient comfort, minimizing local inflammation, and preventing secondary complications. Non-steroidal anti-inflammatory drugs can be used to control pain and reduce local inflammatory symptoms, especially during acute flares. Warm compresses may aid symptom relief by improving local circulation and facilitating drainage (42). In patients presenting with ulceration or secondary infection, topical or systemic antibiotics may be considered based on clinical judgment and microbiological findings. Additionally, appropriate breast support using a well-fitted bra and guidance on local hygiene practices are essential to improving quality of life during treatment. There are also studies reporting benefits of hyperbaric oxygen therapy and ozone therapy as supportive treatments (43,44).

Systemic steroid therapy: Oral steroids are a treatment option for IGM and are considered ideal for initial therapy; they are the most frequently used systemic agents. In cases planned for surgery, oral steroids may be used preoperatively to reduce lesion size and improve cosmesis, thereby reducing the extent of surgical intervention or eliminating the need for surgery (45). They provide rapid shrinkage of the mass and improvement in local inflammatory symptoms; however, in the chronic phase, thick-walled abscesses and fistulas may respond poorly to steroids, and healing may take 1-2 years (46). Their use is limited in pregnant, diabetic, or breastfeeding women, and long-term use may cause adverse effects such as weight gain, osteoporosis, delayed wound healing, glucose intolerance, diabetes mellitus, Cushingoid features, peptic ulcers, and acne (47). The first use of systemic steroids in IGM was reported 45 years ago by DeHertogh et al. (48), who suggested that high-dose steroids (60 mg/day) were more effective for recurrent or resistant cases and reported resolution of masses and closure of sinuses within three weeks.

Combination therapies with oral steroids have also been described. In the study by Koksal (45) recurrence rates were 9% with observation, 6.5% with antibiotics, 10.4% with surgery, 11.1% with steroids, and 0% with combined surgery and steroids. In cases of cutaneous rupture and severe local symptoms, combined steroid, antibiotic, and surgical treatments shortened recovery time and reduced recurrence. In one study, 200 patients with severe local symptoms and cutaneous rupture were given levofloxacin with steroids for 5 days; 156 underwent surgery and 44 continued steroid therapy. Wound healing time was 25 days in the surgical group, compared with 258 days in the non-surgical group. Recurrence rates were 5.1% in the surgical arm and 22.7% in the steroid-only group (48).

In resistant cases, such as bilateral IGM, steroid therapy is also associated with high recurrence rates. In one study, 5 of 10 patients with bilateral IGM (50%) experienced multiple relapses; 4 of these patients were treated with 0.5 mg/kg deltacortril (49). Cases with accompanying erythema nodosum also respond poorly to steroids. These patients often present with diffuse and bilateral disease, follow a more severe course, and have a worse prognosis. Çetin et al. (50) reported that 50% of their patients did not respond to steroid therapy and eventually required surgery.

In immunotherapy, surgical treatment is associated with high recurrence rates, and response to steroids is limited. Therefore, the addition of immunosuppressive agents, such as methotrexate (MTX) or azathioprine (AZA), may be an option to reduce the steroid dose and treat recurrences (49). After demonstrating a role for autoimmune mechanisms, Raj et al. (51) first used AZA in 2004 to treat a relapsed IGM patient and achieved a cure. The addition of AZA to steroid therapy may reduce the steroid dose and prevent recurrence (52). In a study by Senol et al. (53), 29.7% of patients required first-line conservative treatment, while 70.3% required second- or third-line immunosuppressive therapy. Among those who received immunosuppressives (n=355), corticosteroid monotherapy had the highest recurrence rate (28.8%). The addition of MTX reduced the recurrence rate to 19.8%, although this decrease was not statistically significant (p=0.143). AZA therapy significantly reduced recurrence, whether used alone (4.7%) or in combination with corticosteroids (9.1%) (p<0.005). Patients treated with the MTX and AZA combination had a recurrence rate of 4.8%. Overall, significant differences in recurrence rates were observed among treatment groups [χ^2 (4, n=352) =25.58, p<0.001]. Thus, AZA, whether used alone or with other immunosuppressants, was shown to be effective in reducing recurrence rates in IGM patients (52,53).

Konan et al. (54) also administered prednisolone at 40-60 mg/day, gradually tapering to a maintenance dose of 5-7.5 mg every other day for 1.5-2 years. To prevent steroid-associated side effects, 14 of the 15 patients received AZA at 2 mg/kg/day. At three months, at least a 50% reduction in mass was observed in 11 of 15 patients; complete remission was observed at 6 months. Two patients relapsed; overall, 71% achieved complete remission. They concluded that adding AZA to steroids allows rapid dose reduction and improves treatment success, and that surgery should be reserved for cases unresponsive to medical therapy or with relapsing disease (54).

MTX is the most commonly used immunosuppressant worldwide. It is used in IGM patients who are unresponsive to steroids or surgery or who relapse after steroids or surgery; it is also used to allow steroid dose reduction, to shorten treatment duration, or to prevent relapse while tapering or discontinuing steroids (55,56). No standard dose exists for IGM treatment; reports in the literature range from 7.5-25 mg/week for 8-52 weeks (55,56). Compared to surgery and steroids, MTX is associated with lower relapse rates and higher complete remission rates (70-80%). However, it is teratogenic and contraindicated in women who are pregnant, breastfeeding, or planning pregnancy (49,55,56).

Another study conducted by Haddad et al. (56) used MTX-based therapy as initial treatment, either as monotherapy or in combination with low-dose steroids, in 74% of patients. All achieved a CR. Although relapse occurred in 17.6% of patients during dose tapering, all relapsed cases improved with low-dose MTX (56). The largest single-center series of MTX monotherapy was reported from Türkiye. In this study, indications for MTX monotherapy included bilateral disease, fistula, resistance to other therapies, and extensive quadrant involvement. Sixty-four patients, including 56 resistant cases, were treated with oral MTX 15 mg/week for 6 months. In cases of relapse, the dose was increased to 20 mg/week, and treatment was continued for 1 year, with 10 mg of folic acid administered weekly. A CR was achieved in 52 of 64 patients (81.25%). Four patients were lost to follow-up. Eight patients achieved a CR at 1 year after dose escalation. Three patients (4.69%) switched to subcutaneous MTX (12.5-15 mg/week) due to nausea (49).

Treatment Algorithm According to the Turkish IGM Classification

Due to the incomplete understanding of the pathophysiology of the disease, there is considerable heterogeneity in its treatment. The management of IGM is guided by a combined assessment from pathology, breast surgery, and radiology (57). The multidisciplinary nature of diagnosing and treating this complex disease should not be overlooked. The most common treatment approaches include observation (± drainage), topical steroid applications, ILSs, systemic steroids, immunosuppressive agents, combination therapies, surgery, and supportive therapies. Clinicians and breast centers tend to use the treatments with which they are most familiar, based on their clinical experience. The reported success rates of these various treatments range between 65% and 94% (5,32,40,53).

In patients with IGM, treatment planning is based on each patient's clinical condition at the time of diagnosis. In the literature, treatment algorithms have been proposed, varying across countries and clinical settings. Kaviani et al. (33) proposed treatment recommendations based on the severity of inflammatory lesions in the breast. Although cited in some publications, this approach has not gained widespread adoption, even in its country of origin (Iran). In China, an international IGM consensus study, involving more than 80 experts, proposed treatment recommendations and an algorithm. However, this study included not only IGM, but also treatment algorithms for granulomatous mastitis with a defined etiology. Although considered a comprehensive effort, it has been described as complex and difficult to apply in outpatient settings (6).

The treatment algorithm for this disease should be simple, practical, comprehensive, applicable in outpatient settings, and effective in guiding therapy. In this regard, a treatment algorithm based on the Turkish IGM Classification has been published (8). This algorithm was developed through consensus, with the wide participation of experienced breast surgeons. The Turkish IGM treatment algorithm is shown in Figure 4 (8).

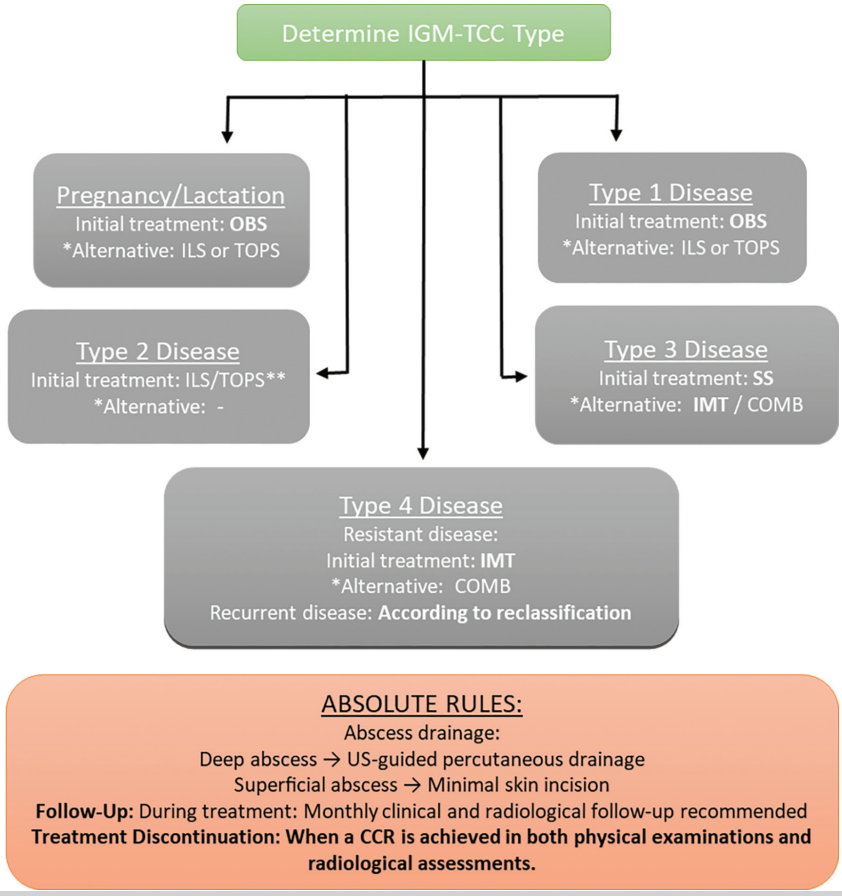

Figure 4. Treatment algorithm based on the Turkish IGM classification.

*: If required, the following treatments may be used as subsequent or adjunctive options to the initial therapy, **: Although the predefined consensus threshold was 80%, a high level of agreement within the 70-80% range supported recommending this option as a first-line treatment for Type 2 disease. Treatments reaching consensus are shown in bold.

OBS: Observation, IGM: Idiopathic granulomatous mastitis, ILS: Intralesional steroid, TOPS: Topical steroid, SS: Systemic steroids, IMT: Immunosuppressive therapy (e.g., methotrexate, azathioprine), COMB: Combination therapy-the use of multiple treatment modalities together (e.g., SS + SURG/IMT/TOPS/ILS; IMT + SURG); CCR: Complete clinical response

This published study presents the consensus-defined treatment recommendations and possible adjunctive therapies in detail. Observation and topical or local treatments are recommended for early-stage disease, while systemic therapies (steroids and immunosuppressive agents) are recommended for more advanced cases. In certain challenging, treatment-resistant cases, combination treatments, such as systemic therapy plus surgery or low-dose steroids plus low-dose immunotherapy, are recommended. Specific recommendations for pregnant and lactating patients are also included. According to this study, surgical treatment—contrary to the broader surgical literature on IGM—is considered only for a limited group of patients. For a benign and inflammatory disease, surgical options are recommended only after medical and interventional therapies have been exhausted. The high recurrence rates following surgical treatment should always be borne in mind.

In addition to outlining a structured treatment pathway, this consensus-based algorithm highlights several clinically relevant strengths. The comparative evaluation of different therapeutic modalities—including topical and intralesional steroids, systemic therapies, immunosuppressive agents, and surgery—supports practical decision-making in daily clinical practice. Furthermore, the integration of evidence derived from prospective studies and large Turkish patient cohorts enhances the reliability and applicability of the recommendations. Finally, the simplified, outpatient-oriented algorithm based on a national consensus classification represents a meaningful step toward standardization in a field traditionally characterized by therapeutic heterogeneity.

We believe that the treatment algorithm based on the Turkish IGM classification fills an important gap in this field and provides clinicians with a structured and practical approach to disease management.

Footnotes

Author Contributions

Surgical and Medical Practices- K.B.Y., G.E., M.A.; Concept - K.B.Y., M.V., M.A.; Design - K.B.Y., M.V., M.A.; Data Collection or Processing - K.Ç., G.E., Y.K.; Analysis or Interpretation - M.E., K.Ç., Y.K.; Literature Search - M.E., K.Ç., M.V.; Writing - M.E., G.E., Y.K.

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