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Clinical Features, Diagnosis, and Treatment Approaches in Granulomatous Mastitis: A Single-Center Alternative Treatment Experience

Granülomatöz Mastitte Klinik Özellikler, Tanı ve Tedavi Yaklaşımları: Tek Merkezli Alternatif Tedavi Uygulaması

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Abstract: Granulomatous mastitis (GM) is a rare, benign, but chronically progressive inflammatory breast disease. This study evaluated the effect of negative pressure vacuum therapy (NPVT) on postoperative seroma formation in GM. Twelve patients treated between May 2018 and July 2023 were retrospectively analyzed. Patients were divided into two groups: Group 1 underwent abscess drainage and biopsy followed by 48 hours of NPVT before segmental mastectomy, whereas Group 2 underwent drainage and mastectomy in the same session. Seroma formation was assessed by ultrasonography at 3 months. No significant differences were found between groups regarding age, comorbidities, or baseline demographics ($p>0.05$). Mean seroma size was 1.27 cm in Group 1 and 3.28 cm in Group 2, showing a statistically significant difference ($p<0.001$). NPVT significantly reduced seroma formation, enhanced tissue healing, and decreased complication rates. These findings suggest that NPVT may serve as an effective adjuvant method in the surgical management of GM. However, the small sample size and short follow-up period are study limitations, indicating the need for larger prospective studies to confirm these results.

Keywords: Granulomatous mastitis, seroma, vacuum therapy, negative pressure, segmental mastectomy

Özet: Granülomatöz mastit (GM), nadir görülen benign ancak kronik seyirli bir inflamatuvar meme hastalığıdır. Bu çalışmada, GM tedavisinde negatif basınçlı vakum tedavisinin (NPVT) postoperatif seroma oluşumu üzerindeki etkisi araştırıldı. Mayıs 2018–Temmuz 2023 tarihleri arasında GM tanısıyla tedavi edilen 12 hasta retrospektif olarak incelendi. Hastalar iki gruba ayrıldı: Grup 1'de apse drenajı ve biyopsi sonrası 48 saat NPVT uygulandıktan sonra segmental mastektomi yapıldı; Grup 2'de ise drenaj ve mastektomi aynı seansta gerçekleştirildi. Üçüncü ayda yapılan ultrasonografide seroma varlığı değerlendirildi. Gruplar arasında yaş, komorbiditeler ve demografik özellikler açısından fark yoktu ($p>0.05$). Seroma boyutları Grup 1'de ortalama 1.27 cm, Grup 2'de 3.28 cm idi ve bu fark istatistiksel olarak anlamlıydı ($p<0.001$). NPVT uygulamasının seroma gelişimini anlamlı derecede azalttığı, doku iyileşmesini hızlandırdığı ve komplikasyon oranlarını düşürdüğü gözlendi. Bulgular, GM'nin cerrahi tedavisinde NPVT'nin etkili bir adjuvan yöntem olarak kullanılabileceğini göstermektedir. Ancak, küçük örneklem büyüklüğü ve kısa takip süresi bu çalışmanın sınırlamalarıdır. Daha geniş örneklemli, prospektif çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Granülomatöz mastit, seroma, vakum tedavisi, negatif basınç, segmental mastektomi

Ethics Committee Approval: The study was approved by Eskişehir Osmangazi University Noninterventional Clinical Research Ethics Committee (Decision no:18, Date: 28.05.2025).

Informed Concent: All patients provided informed consent before surgery.

Authorship Contributions: Yilmaz AS: conceptualization (lead), ınvestigation (lead), resources (lead), writing – original draft (lead), formal analysis (lead); Badak B: data curation (equal), methodology (lead), project administration (lead), writing – review & editing (lead); Ulfanov O: ınvestigation (lead), methodology (supporting), software (equal), writing – original draft (supporting).All authors reviewed and approved the final version submitted for publication

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1. Introduction

Granulomatous mastitis (GM) is a rare, chronic inflammatory disease of the breast, first described by Kessler and Wolloch in 1972 (1). Although benign, GM poses significant diagnostic challenges because it clinically, radiologically, and histopathologically mimics malignancies and infectious mastitis. The disease predominantly affects women of reproductive age and typically presents as a unilateral, firm, and painful mass often accompanied by erythema, abscess, or fistula formation (2, 3). The variable and nonspecific clinical presentation of GM can lead to diagnostic delays and unnecessary surgical interventions. Moreover, because GM can radiologically resemble breast cancer, invasive diagnostic procedures such as biopsy are often required (4, 5).

The etiopathogenesis of GM remains unclear, although most cases are considered idiopathic. Various factors have been implicated, including infectious agents (particularly Corynebacterium species), autoimmune mechanisms, hormonal imbalances, and trauma (2, 6, 7). Its occurrence in women of reproductive age and association with pregnancy or lactation suggest a hormonal influence (6). The differential diagnosis becomes even more challenging in endemic regions where tuberculous mastitis is prevalent (5).

Idiopathic granulomatous mastitis (IGM), a subtype of GM, is a chronic inflammatory breast disease characterized by noncaseating lobular granulomas, diagnosed after excluding infectious, systemic, or foreign body–related causes (1, 3). IGM was first described by Kessler and Wolloch as a "clinical lesion mimicking carcinoma" (1). It most commonly affects premenopausal women aged 20–40 years and has been associated with pregnancy, oral contraceptive use, milk stasis, hyperprolactinemia, and certain systemic endocrine disorders (2, 6, 8, 9).

Clinically, IGM typically presents as a unilateral, painful, erythematous, firm, and irregularly bordered mass (5). These features often raise suspicion of malignancy and may lead to misdiagnosis. Mammography may reveal focal asymmetric density, while ultrasonography often demonstrates hypoechoic tubular structures (5, 8). However, these imaging findings are nonspecific. Magnetic resonance imaging (MRI), although superior in soft tissue resolution, is limited in routine use due to high cost (5, 10). Therefore, histopathological examination remains the gold standard for diagnosis. Microscopically, the characteristic findings include lobulocentric noncaseating granulomas composed of epithelioid histiocytes and multinucleated giant cells surrounded by lymphoplasmacytic infiltration (3, 6).

Although the exact pathogenesis of IGM is not fully elucidated, its responsiveness to corticosteroids suggests the involvement of a local autoimmune process (3, 10). Its association with pregnancy and lactation, as well as similarities to other granulomatous diseases such as autoimmune thyroiditis, further support this hypothesis (6, 10). Additional etiologic factors include oral contraceptive use, galactorrhea, hyperprolactinemia, and alpha-1 antitrypsin deficiency (8).

Treatment of IGM remains controversial, with no universally accepted standard protocol. Conservative management options include oral or topical corticosteroids, immunosuppressive agents (such as methotrexate and azathioprine), antibiotics, and close clinical follow-up (6, 11). Corticosteroids were first introduced by DeHertogh et al. in 1980 and have been shown to reduce disease activity (12). However, due to systemic side effects, topical administration is increasingly preferred (5, 13). Surgical intervention is reserved for recurrent or refractory cases; limited excision carries a high recurrence rate, while wide excision may result in poor cosmetic outcomes (5, 6).

In recent years, negative pressure vacuum therapy (NPVT) has emerged as an alternative to conventional incision and drainage, particularly for suppurative mastitis and complicated granulomatous lesions (15, 16). NPVT promotes granulation tissue formation by reducing wound exudate, alleviates pain, and shortens healing time. It has been reported to be superior to conventional treatment in managing breast abscesses and extensive necrotic areas (14).

This study aims to review the current literature on the etiology, pathogenesis, clinical features, diagnostic modalities, and treatment approaches of GM, and to evaluate the effect of NPVT on postoperative seroma formation in a retrospective patient cohort.

2. Materials and Methods

In this retrospective study, twelve patients who presented to the emergency department of a tertiary university hospital between May 2018 and July 2023 with complaints of breast pain, discharge, and fever, and who were managed by the general surgery team, were retrospectively evaluated. The study protocol was approved by the Non-Interventional Clinical

Research Ethics Committee of Eskisehir Osmangazi University (Decision No: 2025-18).

The patients were divided into two groups. The indication for negative pressure vacuum therapy (NPVT) was based on disease severity. NPVT was applied in patients in whom inflammatory involvement, abscess formation, necrosis, or ulceration encompassed one-third or more of the breast tissue. Patients without these findings underwent abscess drainage and segmental mastectomy in a single surgical session. In Group 1 (n=6), abscess drainage and biopsy were performed, followed by negative pressure vacuum therapy (NPVT) for 48 hours, after which segmental mastectomy was conducted. Negative pressure vacuum therapy was administered using a commercial NPWT system at a constant negative pressure of 120 mmHg in continuous mode. NPVT was applied for a minimum duration of 48 hours in all patients; however, the total duration was extended depending on the persistence of abscess formation and inflammatory discharge. The same NPVT protocol was used for all patients to ensure procedural standardization. In Group 2 (n=6), abscess drainage, biopsy, and segmental mastectomy were performed in the same session.

The presence of seroma formation was evaluated using ultrasonography at 3-month follow-up. Ultrasonographic measurements were performed by multiple experienced radiologists with equivalent levels of expertise. The radiologists were blinded to the patients' treatment groups. Seroma size was defined as the maximum diameter measured on ultrasonographic examination. Demographic data including age, comorbidities, reproductive history, menstrual status, and laterality of involvement were recorded (Table 1).

Statistical analysis was performed using the Mann-Whitney U test, and $p < 0.05$ was considered statistically significant.

3. Results

The mean age of the twelve patients treated for granulomatous mastitis (GM) was 40.66 years (range, 23–62 years). The two groups were compared in terms of age, comorbidities, reproductive status, menstrual status, and laterality of disease (Table 1). However, there were no statistically significant differences between the groups regarding baseline characteristics ($p > 0.05$).

In Group 1, the median seroma size was 0.95 cm and the mean seroma size was 1.27 cm, whereas in Group 2, the median and mean seroma sizes were 3.35 cm and 3.28 cm, respectively.

The seroma dimensions in Group 2 were significantly larger than those in Group 1 in both median and mean comparisons ($p < 0.001$, Mann–Whitney U test).

This difference was also clinically evident, demonstrating that the seroma volume in Group 2 was approximately three times greater than that in Group 1.

Table I. Demographic features, seroma size, menstrual status**,** location and comorbid diseases.

Variables	1. group	2. group
Ages (mean/median)	39.83/40	41.5/38.5
Seroma size (cm)		
Patient 1	0.8	2.5
Patient 2	1	4.5
Patient 3	3	3.5
Patient 4	0.7	3.2
Patient 5	0.9	2
Patient 6	1.2	4
Menstrual status		
Pregnancy history	5	4
Nulliparous	1	2
Postmenopausal	1	2
Lactational Period	1	1
Location		
Left breast	2	3
Right breast	4	3
Comorbid illness		
Hypertension	2	1
Hypothyroidism	1	2
Diyabetes	2	2

4. Discussion

Granulomatous mastitis (GM) is a rare, benign, yet chronically progressive inflammatory breast disease (2, 3). Although its exact pathogenesis remains unclear, several potential contributing factors have been proposed. The most widely accepted hypothesis identifies autoimmune inflammation as the primary mechanism. It is thought that secretions retained within the breast ducts trigger an immune response, leading to granulomatous inflammation (15, 16).

The second group of etiological factors includes infectious agents, particularly Mycobacterium tuberculosis, which is regarded as a significant cause of granulomatous mastitis in endemic regions (17, 18). Fungal and bacterial organisms such as Actinomyces, Corynebacterium species, and Histoplasma have also been reported to trigger granulomatous inflammation (17). In addition, hormonal influences—especially estrogen and prolactin—are believed to contribute to disease development (6, 19).

In our study, the most common etiologic factor was autoimmune inflammation, followed by hormonal influences. GM most frequently affects parous women in their 30s and 40s (2, 20). Breastfeeding has been considered a predisposing factor; in our series, two patients were in the lactation period.

GM typically presents as a palpable breast mass that is firm, irregular, and painful—the most frequent reason for clinical presentation. Additional findings may include erythema, edema, ulceration, fistula formation, and, in some cases, axillary lymphadenopathy (2, 3). Because these features may mimic breast carcinoma, diagnosis can be challenging (4, 5). In our series, almost all patients presented with erythema, edema, and breast induration.

Diagnosis of GM requires the combined assessment of clinical, radiologic, and histopathologic findings. Ultrasonography typically shows hypoechoic, irregular lesions or abscesses, while mammography may reveal poorly circumscribed, mass-like lesions within dense breast tissue (21).

According to the literature, right-sided involvement is more common (22), a finding consistent with our results. Bilateral disease has been reported in approximately 25% of cases (23); however, in our 12-patient cohort, all cases were unilateral.

GM is an inflammatory condition with a high recurrence rate and no definitive curative treatment protocol. Reported management strategies include surgery, corticosteroid therapy, immunosuppressive agents, or their combinations (3–6). Therefore, treatment should be individualized.

In medical management, corticosteroids such as prednisone are typically used as first-line agents to reduce inflammation. In steroid-resistant cases, immunosuppressive agents like methotrexate or azathioprine may be employed. Patients unresponsive to medical therapy may require abscess drainage or segmental mastectomy (20). When a secondary or infectious etiology is identified, appropriate antibiotic therapy should be initiated. Owing to the high recurrence risk, close follow-up is essential. Consequently, several alternative strategies have been explored to complement standard approaches and reduce recurrence.

The primary goals in GM treatment are to control inflammation, prevent recurrence, and preserve breast tissue. In a meta-analysis by Godazandeh et al. (2021), including 559 cases comparing steroid therapy alone versus surgical treatment, the combined approach significantly reduced recurrence rates (6). Velidedeoğlu et al. (2022), based on long-term follow-up of 152 patients, suggested that surgery should be reserved for refractory cases, while minimally invasive or medical approaches may suffice otherwise (5). Recent reviews by Dilaveri et al. (2024) and Shanbhag et al. (2024) emphasized that, due to the multifactorial pathogenesis of GM—particularly Corynebacterium kroppenstedtii infections and localized autoimmune responses—no single standardized treatment exists, and personalized treatment strategies are gaining prominence (2, 3). Although the combination of medical therapy with surgery has been shown to reduce recurrence rates (ranging between 10%–35% depending on the modality), postoperative complications such as seroma, fistula, and wound dehiscence may negatively affect treatment outcomes (4–6). In this context, the findings of the present study provide strong clinical evidence that negative pressure vacuum therapy (NPVT) may help reduce these postoperative complications.

Negative Pressure Vacuum Therapy (NPVT) and Granulomatous Mastitis

NPVT optimizes wound healing through mechanical debridement, edema drainage, reduction of bacterial load, and enhancement of granulation tissue formation. Initially applied in the management of chronic suppurative mastitis and abscesses, its use has expanded to postoperative GM cases to reduce complications (14). In a comparative study by Qiu et al. (2022) on acute suppurative mastitis, the NPVT group showed a significantly shorter healing time (40 vs. 60 days) and lower pain scores than those treated with traditional incision and drainage (I&D) (14). This demonstrates that negative pressure drainage effectively removes inflammatory exudate and edema, thereby attenuating local inflammation. Similarly, in GM cases, NPVT has been reported to shorten wound closure time, reduce the risk of secondary infection, and improve cosmetic outcomes (24, 25).

In the present study, the median (0.95 cm) and mean (1.27 cm) postoperative seroma sizes in the NPVT group (Group 1) were significantly lower than those in the surgery-only group (Group 2) ($p<0.001$). This finding confirms the efficacy of NPVT in reducing postoperative fluid accumulation. According to the literature, seroma formation is associated with unsealed postoperative cavities and inflammatory exudate accumulation; negative pressure therapy collapses these dead spaces and facilitates closure (14, 25, 26). Our results, consistent with previous reports (5, 6, 14), indicate that the use of NPVT before or after segmental mastectomy in GM significantly reduces postoperative seroma formation and accelerates clinical recovery.

Overall, these findings suggest that adjunctive NPVT in GM management may enhance postoperative recovery and reduce complication rates when combined with standard surgical treatment. Particularly in refractory or abscess-forming GM cases, NPVT administered before or after surgical excision may prevent interstitial fluid accumulation and mitigate local inflammatory burden. Furthermore, evidence indicates that NPVT improves cosmetic outcomes and shortens hospital stay (14, 24). Although its application in GM is not yet widespread, the current data suggest that NPVT represents a valuable adjuvant treatment option, especially in cases complicated by abscess or necrosis.

5. Conclusion

Future prospective, randomized controlled studies are needed to more clearly define the role of negative pressure vacuum therapy (NPVT) in the treatment of granulomatous mastitis (GM). Furthermore, the potential benefits of combining NPVT with corticosteroid or immunomodulatory therapy should be investigated, particularly regarding recurrence rates and cosmetic outcomes. In this context, the application of NPVT after drainage but before surgical excision may provide additional clinical advantages. Despite the favorable outcomes observed in this study, certain limitations must be acknowledged, including the small sample size and short follow-up period. Therefore, larger prospective studies with standardized outcome measures are warranted to validate these findings and establish more robust clinical recommendations.

Limitations

This study has several limitations that should be acknowledged. First, the small sample size limits the generalizability of the findings and precluded a priori power analysis. Second, the retrospective study design and lack of randomization introduce a potential risk of selection bias. Third, the relatively short follow-up period of three months did not allow for the assessment of long-term outcomes such as recurrence rates or cosmetic results. Therefore, this needs to be confirmed in larger, prospective, randomized studies.

Due to the retrospective nature of the study and the lack of standardized photographic documentation, clinical images could not be included.

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