Original Article

Pyoderma Gangrenosum in Clinical Practice: Five Years of Experience from a Tertiary Referral Center

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Abstract

Aim: Pyoderma gangrenosum (PG) is a rare neutrophilic dermatosis that causes a high wound burden. Diagnosis is difficult, and treatment is inconsistent. We aimed to describe clinical features, treatments administered, outcomes, and the safety profile of those treatments in a tertiary-center cohort.

Materials and Methods: We performed a single-center retrospective study (2020–2025). PG was diagnosed by clinicopathologic assessment using the PARACELSUS scoring system and by exclusion of mimicking conditions. Responses were predefined: [complete response (CR), ≥ 75% ulcer reduction without active inflammation or new ulcers], [partial response (PR), 30–< 75% with supportive signs], and [no response (NR), < 30% or progression]. We recorded total treatment duration (TTD) and total number of treatments (TNTs).

Results: Fourteen patients were included (7 women, 7 men; mean age 53.0). The ulcerative subtype was most common (n = 12/14, 85.7%); pathergy was present in 35.7% (n = 5/14). The lower limbs were the most frequent sites (n = 5/14, 35.7%). First-line therapy consisted mainly of topical and/or systemic corticosteroids (CR 57.1%, PR 7.1%, NR 35.7%). Second-line regimens (steroids, cyclosporine, colchicine, adalimumab) resulted in CR, PR, and NR rates of 28.6%, 28.6%, and 42.9%, respectively. Third-line therapy (steroids, intravenous immunoglobulin, or cyclosporine) produced PR in all cases. Infliximab, administered as fourth-line therapy (n = 3), achieved CR in 66.7% and PR in 33.3%; one wound infection occurred. The overall TTD was 4.61 ± 4.48 months (median 3, range 1.5–18) and TNT was 1.93 ± 1.21 (median 2, range 1–4). Adverse events occurred in 35.7% of patients overall and in 44.4% of steroid-exposed patients, typically at 3 months. TTD correlated with adverse events [r = 0.74; $P = 0.002$; 95% confidence interval (0.34, 0.91)]. No statistically significant sex-related differences were observed in treatment response distribution, TTD, or TNT ($P > 0.05$); however, descriptive trends suggested that females tended toward longer TTD, whereas males exhibited higher TNT.

Conclusion: Corticosteroids are effective, but time-dependent toxicity is common. Early steroid-sparing strategies are advisable. Infliximab showed favorable response rates in refractory PG. Structured wound care should accompany all pharmacologic treatments. Larger prospective studies are needed.

Keywords: Pyoderma gangrenosum, skin ulcer, therapy

Introduction

Pyoderma gangrenosum (PG) is a rare, chronic neutrophilic dermatosis characterized by rapidly progressive, painful ulcerations.[1] Despite its rarity, it carries a disproportionately high clinical impact owing to substantial wound burden, tissue-destructive potential, and an unpredictable course.

PG may occur in isolation or in association with systemic conditions such as inflammatory bowel disease, rheumatoid arthritis, and hematologic malignancies, though idiopathic forms are common.[1,2]

Clinical presentations are heterogeneous, ranging from classical ulcerative to pustular, bullous, and vegetative variants.[3] As no specific diagnostic markers exist, PG remains a diagnosis of exclusion,[4,5] and diagnostic delays are common.

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The disease course is highly variable, and reliable prognostic markers remain lacking.[6,7]

Contemporary management of PG rests on two coequal pillars: structured wound care and disease-directed anti-inflammatory therapy. Wound care is a core therapeutic modality that requires standardized protocols addressing cleansing, moisture balance, infection prevention, pain management, periwound skin protection, and compression or offloading when indicated. In parallel with structured wound care, systemic corticosteroids and immunosuppressive agents such as cyclosporine remain the cornerstone of first-line therapy.[8,9] In refractory cases, biologic agents, including anti-tumor necrosis factor (TNF) agents such as infliximab and adalimumab, have shown efficacy.[10,11] More recently, therapies targeting interleukin pathways or B cells have been trialed, though their role remains uncertain and, in some cases, paradoxically associated with PG induction.[12-15] Despite these therapeutic advances, the absence of standardized treatment algorithms or universally accepted guidelines continues to limit evidence-based clinical practice.

The lack of standardized guidelines creates an urgent need for high-quality, real-world data to inform evidence-based management strategies.

The present study aims to evaluate the clinical characteristics, treatment modalities, treatment safety, and therapeutic responses of patients with PG treated at a tertiary center over a five-year period. By examining long-term outcomes and exploring potential sex-related differences, this work seeks to contribute valuable real-world data that may support more individualized and standardized approaches to PG management.

Materials and Methods

This single-center, retrospective cohort study was conducted between 2020 and 2025 at a tertiary referral center. The diagnosis of PG was established based on clinical presentation, histopathological findings, and exclusion of alternative causes, using the PARACELSUS scoring system as a structured diagnostic aid.[16] All patients had PARACELSUS scores consistent with a definite or probable diagnosis of PG. Clinical data were collected from electronic medical files and patient charts. Patients with incomplete medical records or uncertain diagnoses were excluded. Extracted variables included demographic and clinical characteristics, treatment regimens, and treatment outcomes.

Treatment outcomes were categorized retrospectively based on the information available in patient records:

- A complete response (CR) was defined as a ≥ 75% reduction in ulcer surface area together with the absence of active inflammation and no new or satellite ulcers.
- Partial response (PR) was defined when the charts reflected a 30% to < 75% reduction in ulcer surface area, accompanied by at least two supportive findings such as decreased erythema, a ≥ 2-point reduction on a 10-point visual analog scale (when available), decreased exudation, evidence of re epithelialization or flattening of lesion margins, and the absence of new or satellite ulcers.
- No response (NR) was defined as a < 30% reduction in ulcer surface area, or any documented progression, including new or satellite ulcer formation, lesion enlargement, or worsening inflammatory features.

These cut-off values were determined based on previously published PG cohorts and treatment response classifications to ensure comparability with existing literature.[17-19]

In addition, two treatment-related variables were analyzed for each patient. The total treatment duration (TTD) was defined as the number of months; the total number of treatments (TNT) was defined as the total number of distinct treatment regimens administered per patient from the date of diagnosis to the achievement of complete clinical response. TNT was regarded as an indirect indicator of treatment resistance.

Statistical Analysis

All analyses were performed using IBM SPSS Statistics version 22 (SPSS Inc., Chicago, IL, USA). Categorical variables were expressed as numbers (n) and percentages (%), and continuous variables as mean ± standard deviation, median, minimum, and maximum values. The distribution of continuous variables was assessed using the Shapiro-Wilk test. Given the limited sample size and the frequent deviations from normality, non-parametric tests were applied. The Mann-Whitney U test was used for comparisons between two independent groups, the Kruskal-Wallis H test was used for comparisons among more than two groups, and Spearman's rank correlation coefficient was used for assessing associations between continuous variables. Spearman's correlation was selected as the primary measure of association because it is robust to non-normal distributions and small sample sizes; however, given the limited number of observations (n = 14) and the reduced statistical power in subgroup analyses, correlation results should be interpreted with caution. To aid interpretation, 95% confidence intervals (CIs) were calculated alongside *P*-values where applicable. Point-biserial correlation (equivalent to Spearman for binary variables) was used to assess associations between dichotomous and continuous variables. Categorical variables were compared using the chi-square test or Fisher's

exact test, as appropriate. Statistical significance was set at $P < 0.05$.

Ethical approval for this study was obtained from the Uşak University Non-Interventional Clinical Research Ethics Committee (approval number: 807-807-28, date: 24.07.2025). The study was conducted in accordance with the principles of the Declaration of Helsinki. No identifiable personal information was collected, and all data were anonymized prior to analysis.

Results

Patient Selection and Demographics

A total of 19 patients with a recorded diagnosis of PG were initially identified from hospital archives. Following the exclusion of cases with incomplete medical records or uncertain diagnoses, 14 patients (7 females and 7 males) met the eligibility criteria and were included in the final analysis.

The mean age of the study population was 53.0 ± 13.5 years (range 31–73). Female patients had a mean age of 55.85 ± 12.99 years (range 31–73), while male patients were slightly younger with a mean of 49.42 ± 13.50 years (range 36–69). The average disease duration across the cohort was 18.0 ± 34.3 months (median 6 months, range 0–108). Female patients had a shorter disease duration (mean 13.29 ± 17.42 months, median 4 months, range 0–48) compared with males (mean 23.90 ± 47.05 months, median 3 months, range 1–108), although variability was greater in the male subgroup.

Disease Characteristics

The majority of patients presented with the ulcerative subtype, which was observed in all female patients (7/7; 100%) and in 5 out of 7 male patients (71.4%). Bullous and pustular variants were each identified in one male patient (14.3%). Pathergy positivity was observed in 5 of 14 patients (35.7%), with no significant difference between sexes.

The lower extremities were the most frequently affected anatomical sites, affecting 2 female patients (28.6%) and 3 male patients (42.9%). Other affected regions included the gluteal region (1 female, 2 males), the upper extremities (1 female, 1 male), the abdomen (1 female), the back (1 female), and the face (1 female, 1 male). The detailed anatomical distribution and subgroup comparisons are illustrated in Figure 1.

Comorbidities were frequently observed across both sexes. Among female patients, the most common comorbid conditions were diabetes mellitus, obesity, and hepatosteatosis. In male patients, hypertension was the most frequent condition. A detailed summary of individual comorbidities is presented in Table 1.

Treatment Outcomes

Response rates were calculated per treatment line, not per individual medication. As shown in Figure 2, systemic and topical corticosteroids were the most frequent first-line therapies, together accounted for the majority of initial treatment regimens. In this group (n = 14), CR, PR, and NR were observed in 57.1% (n = 8/14), 7.1% (n = 1/14), and 35.7% (n = 5/14), respectively. Second-line therapies included agents such as systemic corticosteroids, combined systemic and topical corticosteroids, cyclosporine, colchicine, and adalimumab. Among these patients (n = 7), CR occurred in 28.6% (n = 2/7), PR in 28.6% (n = 2/7), and NR in 42.9% (n = 3/7). In the third-line group (n = 3), all patients were treated with systemic corticosteroids, intravenous immunoglobulin, or cyclosporine, and all demonstrated PR (100.0%, n = 3/3). Infliximab, administered as a fourth-line option, resulted in CR in 66.7% (n = 2/3) and PR in 33.3% (n = 1/3).

When stratified by sex, no statistically significant differences in overall response distribution were observed between female and male patients ($\chi^2 = 0.96$, $P = 0.62$). However, descriptive trends were noted: female patients showed a higher proportion of CR than male patients (50.0% vs. 40.0%), whereas male

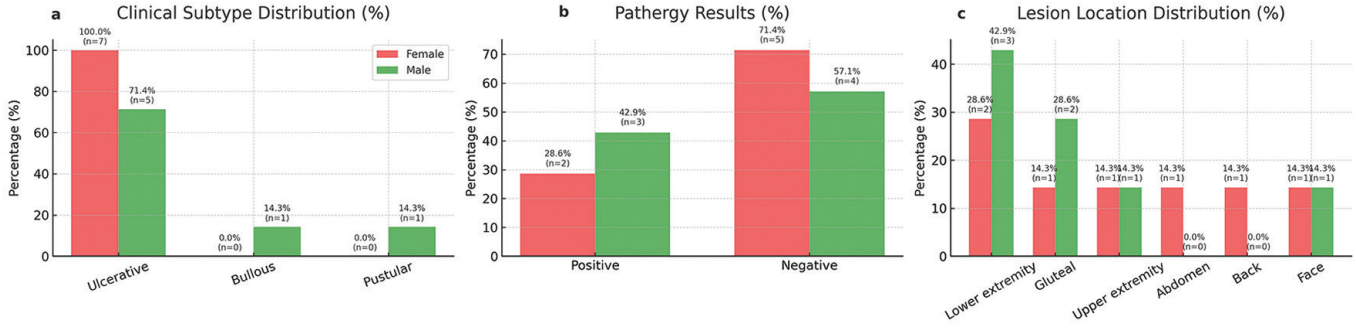

Figure 1. Sex-specific distribution of key disease characteristics, demonstrating variations in clinical subtypes (a), pathergy reactivity (b), and anatomical localization of lesions (c)

Table 1. Comorbidities observed in the study population, stratified by sex; percentages are calculated within each sex group and totals exceed 100% because some patients had more than one comorbid condition

Comorbidity	Female n (%)	Male n (%)
Diabetes mellitus	3 (42.9)	1 (14.3)
Obesity	2 (28.6)	1 (14.3)
Hepatosteatosis	2 (28.6)	1 (14.3)
Heart failure	1 (14.3)	0 (0.0)
Arrhythmia	1 (14.3)	0 (0.0)
Coronary artery disease	1 (14.3)	1 (14.3)
Hypertension	0 (0.0)	2 (28.6)
Asthma	0 (0.0)	1 (14.3)
Brucellosis	0 (0.0)	1 (14.3)
Essential thrombocythemia	0 (0.0)	1 (14.3)
Hypothyroidism	1 (14.3)	0 (0.0)
Behçet's disease	1 (14.3)	0 (0.0)
Morphea	1 (14.3)	0 (0.0)
Peripheral vascular disease	0 (0.0)	1 (14.3)
History of trauma/surgery	0 (0.0)	1 (14.3)

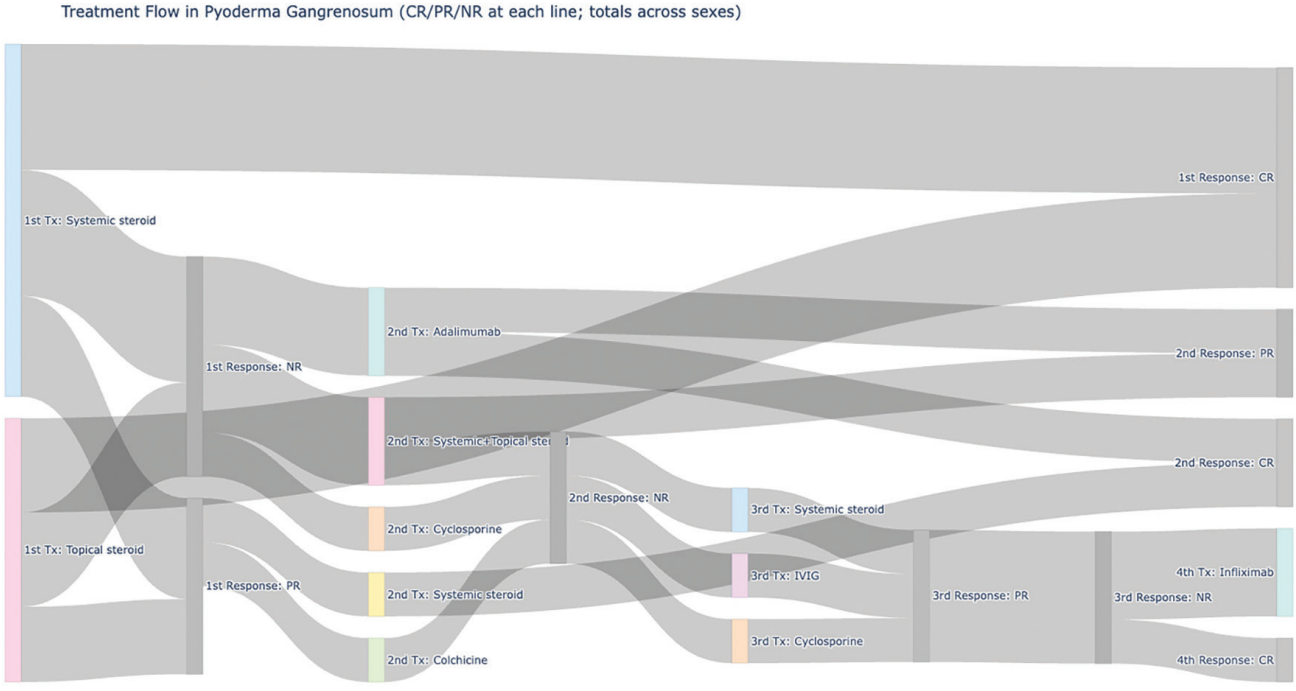

Figure 2. Treatment flow in pyoderma gangrenosum across sequential therapy lines. The diagram illustrates first-line corticosteroid-based regimens, subsequent transitions to second-, third-, and fourth-line agents, and their corresponding clinical responses
CR: Complete response, PR: Partial response, NR: No response

patients more frequently demonstrated PR than female patients (33.3% vs. 16.7%). NR rates were comparable between the sexes (33.3% vs. 26.7%).

Adverse Events and Reasons for Treatment Discontinuation

Adverse events were observed in 5 of 14 patients (35.7%). Among patients exposed to systemic corticosteroids in any treatment line (n = 9), adverse events occurred in 4 patients (44.4%), with some individuals experiencing more than one reaction. Corticosteroid-associated events included hyperglycemia in 2/9 (22.2%), weight gain in 1/9 (11.1%), and fatigue with purpura or ecchymosis in 1/9 (11.1%); iatrogenic Cushing's syndrome was recorded in 1/9 (11.1%). In patients receiving systemic corticosteroid therapy, adverse events were most commonly observed within the early treatment period, emerging at 3.7 ± 0.6 months (median 3 months, range: 3–5) after initiation.

Among patients exposed to infliximab (n = 3), a wound-site infection developed in one patient during the 3rd week of treatment. No statistically significant differences were observed between female and male patients regarding the occurrence of adverse events. A detailed breakdown of adverse events is provided in Table 2, with proportions calculated relative to the number of patients exposed to each therapy.

Total Treatment Duration and Total Number of Treatments

In the overall cohort, the TTD was 4.61 ± 4.48 months (median 3, range 1.5–18), and the TNT was 1.93 ± 1.21 (median 2, range 1–4). When stratified by sex, TTD was longer in females at 6.03 ± 5.88 months (median 3, range 1.5–18) compared with males at 3.19 ± 1.93 months (median 2.62, range 2–7.5). Conversely, TNT was higher in males at 2.14 ± 1.34 (median 2, range 1–4) compared with females at 1.71 ± 1.11 (median 1, range 1–4).

Correlation Analyses

No correlation was found between disease duration, presence of comorbidity, or pathergy positivity and either TTD or TNT ($P > 0.05$). No correlation was detected between disease duration and the occurrence of adverse events ($P > 0.05$). No statistically significant associations were found between sex and TTD, TNT or the occurrence of adverse events ($P > 0.05$). Additionally, the overall response distribution did not differ by sex ($\chi^2 = 0.96$, $P = 0.62$).

A significant positive correlation was observed between TTD and the occurrence of adverse events [Spearman r = 0.74, $P = 0.002$; 95% CI (0.34, 0.91)]. Although not statistically significant, females tend to have longer TTD (6.03 ± 5.88 months vs. 3.19 ± 1.93 months in males, $P > 0.05$), whereas males exhibited higher TNT (2.14 ± 1.34 vs. 1.71 ± 1.11, $P > 0.05$).

Discussion

When evaluating the demographic and disease-specific characteristics of our cohort, we observed patterns that are largely consistent with those reported in the existing literature: the predominance of the ulcerative subtype, the frequent involvement of the lower extremities, the frequency of pathergy positivity, and the occurrence of comorbid conditions such as diabetes and cardiovascular disease.[20-22] Although our cohort consists of a limited number of patients, it nevertheless provides a representative sample reflecting the typical clinical spectrum of PG. This supports the external validity of our observations and suggests that the findings may be generalizable, at least in part, to the broader patient population.

Our observations indicate that treatment selection often did not adhere to a uniform, stepwise algorithm, with decisions appearing to be guided by clinical judgment and patient-specific considerations. First-line therapies most commonly consisted of topical, intralesional, and systemic corticosteroids. In cases of inadequate response, systemic corticosteroids were frequently combined with topical or intralesional preparations rather than being replaced by other immunosuppressive agents. Notably, cyclosporine was rarely used as initial therapy and was instead reserved for later lines of treatment. This finding differs from the prevailing literature, where cyclosporine is more often considered in earlier stages.[8-10,23] The tendency to postpone cyclosporine use in our study may be related to the older age of our patients, the presence of comorbidities, and concerns regarding its strong immunosuppressive effects, which could further limit its suitability.

Systemic corticosteroids were associated with the majority of adverse reactions in our cohort, most of which emerged after approximately three months of therapy. This observation highlights the critical window during which the risk of corticosteroid-related adverse events becomes most pronounced. In line with this, a recent review emphasized that long-term tolerability of corticosteroids is limited by their

Table 2. Treatment-related adverse events observed in patients. The drug-event relationship was determined based on temporal association, biological plausibility, and exclusion of alternative causes. Percentages are calculated relative to the number of patients exposed to each therapy

Therapy	Patients exposed (n)	Adverse events (n, %)
Systemic corticosteroids	**9**	**4 (44.4%)**
Hyperglycemia		2 (22.2%)
Weight gain		1 (11.1%)
Fatigue with purpura/ecchymosis		1 (11.1%)
Iatrogenic Cushing's syndrome		1 (11.1%)
Infliximab	**3**	**1 (33.3%)**
Wound site infection		1 (33.3%)

adverse effects and a cohort study reported that prolonged prednisone exposure was associated with higher mortality.[24,25] To mitigate these complications, the early introduction of corticosteroid-sparing agents within the first three months of treatment may be advisable. Such an approach could reduce cumulative corticosteroid exposure and improve long-term tolerability while maintaining disease control. However, due to incomplete documentation, no specific conclusions could be drawn regarding corticosteroid dosages in relation to adverse events. Nevertheless, the average starting dose of systemic prednisolone in our cohort was between 0.5 and 1 mg/kg/day, consistent with commonly reported initial dosing regimens in the literature.

In our cohort, infliximab was typically reserved for the later stages of treatment. Nevertheless, we observed that it produced the most successful clinical responses, with all treated patients achieving either complete or partial remission. Notably, one patient developed a wound-site infection during the induction phase of biologic therapy, underscoring the need for careful monitoring for infectious complications.

Although adalimumab was also employed, its outcomes were less consistent than those observed with infliximab, indicating a potential advantage of infliximab over other anti-TNF agents. Previous reports similarly highlight infliximab as the anti-TNF agent with the highest rates of response in PG.[25,26] This may be because infliximab dosing is adjusted for body weight.

Although our study is limited to make a definitive comparison, our findings suggest that the efficacy of anti-TNF agents remains high regardless of comorbidities in line with literature.[27,28] Yet, their preferential use may be justified when comorbid conditions, such as inflammatory bowel disease, offer additional therapeutic benefits. Interestingly, paradoxical cases of PG induced by anti-TNF agents have also been reported in the literature, highlighting the complexity of the underlying pathogenesis and the need for further mechanistic research, and such paradoxical reactions should be kept in mind in clinical practice.[29,30]

Sex-related descriptive trends, although not statistically significant ($P > 0.05$), were observed in our cohort. Female patients achieved complete remission more frequently, yet required longer treatment durations (TTD), suggesting a tendency to be late responders. In contrast, male patients more commonly exhibited PRs and required a greater number of treatment lines (TNT), which may indicate a greater degree of treatment resistance. While our sample size is limited and these findings were not statistically significant, they nevertheless raise the possibility of underlying sex-related differences in treatment dynamics that merit further exploration in larger cohorts. Although this has not been specifically addressed in prior studies, it is well established that immune responses differ between sexes,[31] and this could naturally influence the efficacy of immunosuppressive agents.

In our series, the risk of adverse events increased with longer cumulative treatment duration, a pattern that was particularly pronounced among patients receiving systemic corticosteroids. These observations underscore the need to optimize treatment duration to balance efficacy and safety. One potential strategy would be to use standardized disease severity assessment tools at baseline to guide the selection of appropriately potent therapies from the outset. Tailoring treatment intensity to disease severity may reduce both TTD and the cumulative burden of adverse effects. Ultimately, larger studies are warranted, and the development of internationally accepted guidelines will be essential to standardize treatment decisions and improve long-term outcomes in PG.

Finally, our observations underscore the role of wound care as a primary therapeutic modality alongside systemic treatment. In our cohort, as is frequently the case in general dermatologic practice, standardized wound care protocols were inconsistently applied during the treatment course, which may have influenced healing outcomes and the accuracy of therapeutic response assessment. Appropriate wound management, including meticulous infection control and prevention of secondary colonization, should accompany every treatment line as a standard component of care.[32,33] Accordingly, structured wound care should be initiated as early as possible while diagnostic and etiologic evaluations proceed.

Additionally, optimization of comorbid conditions and general supportive measures may complement pharmacologic treatment.

Study Limitations

This study has inherent limitations, including its retrospective, single-center design and small sample size. Consequently, the statistical power was limited, and correlation analyses largely remained descriptive rather than conclusive. Furthermore, the duration of resistance to prior treatments could not be systematically assessed among patients who received infliximab, and time-to-response data were not available, which limits interpretation of comparative treatment efficacy. Nonetheless, the study provides valuable real-world insights into treatment burden, sex-related variability, and therapeutic aspects of PG. Future multicenter prospective studies with standardized outcome measures are needed to validate these findings and to support the development of evidence-based management guidelines.

Conclusion

PG remains a complex disease that requires individualized management. While corticosteroids are widely used, their adverse effects argue for the early introduction of corticosteroid- sparing strategies. Infliximab produced consistent, favorable responses in our cohort, supporting its use in refractory cases. Wound care should be positioned as a primary therapeutic modality, delivered in parallel with pharmacologic treatment and implemented using standardized protocols that address cleansing, moisture balance, infection prevention, pain control, and protection of periwound skin, including compression or offloading when indicated. Optimization of comorbidities and other supportive measures complements this dual approach. This study provides real-world data that may support more individualized and more standardized care. Larger prospective studies and international guidelines are needed to further standardize management and improve outcomes.

Ethics

Ethics Committee Approval: Ethical approval for this study was obtained from the Uşak University Non-Interventional Clinical Research Ethics Committee (approval number: 807-807-28, date: 24.07.2025).

Informed Consent: No identifiable personal information was collected, and all data were anonymized prior to analysis.

Footnotes

Authorship Contributions

Surgical and Medical Practices: E.G., S.Ü., Concept: E.G., S.Ü., Design: E.G., S.Ü., Data Collection or Processing: E.G., S.Ü., Analysis or Interpretation: E.G., Literature Search: E.G., S.Ü., Writing: E.G.

Conflict of Interest: The authors declare that they have no conflict of interest.

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