



## Original Article

# Ultrasound-guided Percutaneous Galvanic Current Compared to Ultrasound-guided Intralesional Corticosteroid Infiltration in Tunnels of Hidradenitis Suppurativa



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## ABSTRACT

**Background:** Hidradenitis suppurativa (HS) is a chronic inflammatory condition primarily affecting pilosebaceous units in areas with apocrine sweat glands. Although treatment options vary, intralesional therapies are often necessary, even under systemic treatment, but have limitations such as variable efficacy and inability to eliminate persistent tunnels. Percutaneous galvanic current may constitute an alternative intralesional therapy in HS.

**Objective:** This study aimed to compare the efficacy and safety of ultrasound-guided percutaneous galvanic current (GC) with ultrasound-guided intralesional triamcinolone acetone (AT) in treating inflammatory or draining HS tunnels. Additionally, the study sought to analyze the ability of both therapies to physically eliminate treated HS tunnels.

**Methods:** Ambispective observational study including patients treated with GC and AT for HS tunnels. Efficacy and safety were assessed 12 weeks post-treatment, complete response to treatment was defined as the absence of spontaneous suppuration or upon vigorous digital pressure during physical examination, coupled with the absence of Doppler signal suggestive of inflammatory activity on ultrasound.

**Results:** Sixty-six patients were included, with 26 receiving GC and 40 receiving AT. Both groups showed comparable socio-demographic and clinical characteristics. At 12 weeks, complete response was observed in 77.6% of GC-treated patients compared to 55% of AT-treated patients. Ultrasound evaluations revealed that GC treatment resulted in fibrosis formation in 38.46% of treated tunnels. GC demonstrated a significant reduction in pain intensity compared to AT. Safety profiles were favorable for both treatments.

**Conclusion:** Ultrasound-guided percutaneous galvanic current may constitute an intralesional treatment alternative in inflammatory and draining HS tunnels, with the potential to physically eliminate the treated lesion and with an acceptable safety profile.

## Introduction

Hidradenitis suppurativa (HS) is a chronic inflammatory disease affecting pilosebaceous units in areas rich in apocrine sweat glands.<sup>1,2</sup> In genetically predisposed individuals, factors such as cutaneous dysbiosis, smoking, and altered follicular keratinization lead to obstruction of the pilosebaceous unit and the release of keratin and sebum into the dermis, which subsequently triggers an inappropriate inflammatory response.<sup>3</sup> Clinically, this inflammation manifests as inflammatory no-

dules, abscesses, and – if persistent – draining tunnels and irreversible scarring.<sup>1,2</sup>

Activation of innate immunity through the NLRP3 inflammasome (NOD-like receptor family) initiates the inflammatory process and stimulates the release of cytokines involved in HS: tumor necrosis factor alpha (TNF- $\alpha$ ), interleukin 1 $\beta$  (IL-1 $\beta$ ), IL-17, and IL-23.<sup>3,4</sup> In addition, local dysbiosis and the presence of bacterial biofilms within tunnels may act as antigenic trigger, exacerbating suppuration and malodor.<sup>5</sup>

Therapeutic options for HS vary according to severity and clinical phenotype and range from topical antibiotics to surgical excision of the affected tissue.<sup>6</sup> Currently, biologic drugs targeting molecules involved in the pathophysiology – such as TNF- $\alpha$  and IL-17 – are available.<sup>7–9</sup> Ho-

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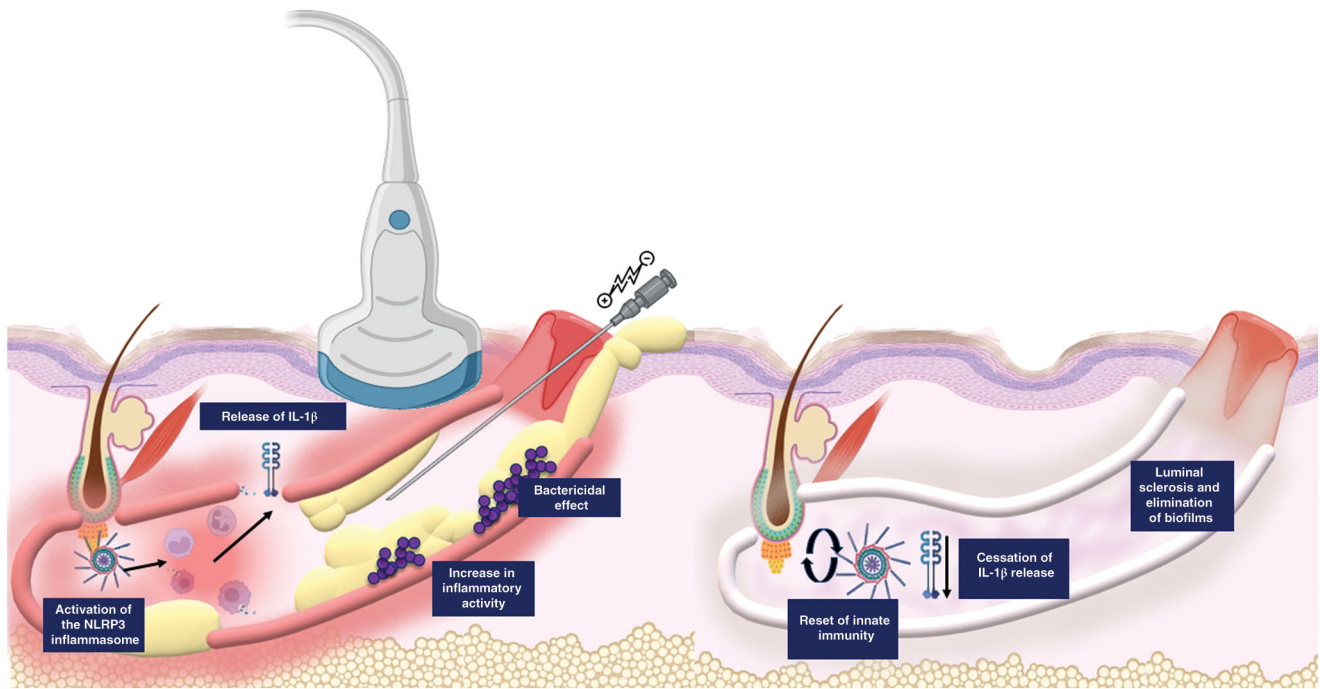
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**Fig. 1.** Role of the inflammasome in the pathophysiology of inflammatory tunnels in hidradenitis suppurativa and mechanism of action of percutaneous galvanic current. Following inflammasome activation and the bactericidal effect of the current, tunnel fibrosis and elimination of biofilms are achieved.

wever, flares of inflammatory activity often persist in patients with HS undergoing biologic therapy, requiring repeated use of local “bailout” therapies.<sup>10</sup> Nevertheless, classical intralesional therapies have two major limitations: variable efficacy (44–81%)<sup>10</sup> and difficulty in physically eliminating definitive structures such as HS tunnels.<sup>11</sup>

In the absence of an optimal intralesional therapy, interest in ultrasound-guided percutaneous electrolysis has increased. Its mechanism of action is based on the administration of galvanic current, generating adaptive activation of the NLRP3 inflammasome; the production of IL-1 $\beta$  and subsequent formation of type I collagen would be responsible, respectively, for elimination of the epithelial lining of the tunnel and its replacement by a cicatricial structure.<sup>12,13</sup> Additionally, alkalinization of the medium and transmission of a supra-threshold current intensity may exert a bactericidal effect on bacterial biofilms.<sup>14,15</sup> This hypothesis, proposed based on *in vitro* findings,<sup>12,14,15</sup> has already been confirmed in mammary and HS fistulous structures in clinical practice<sup>16,17</sup> (Fig. 1).

## Materials and methods

### Design

We conducted an ambispective observational study including patients with HS tunnels treated with ultrasound-guided percutaneous galvanic current (GC) or ultrasound-guided intralesional triamcinolone acetonide injection. The safety and efficacy profile of both therapies were evaluated 12 weeks into therapy. The STROBE guidelines were followed for the design of this observational study.

Data corresponding to patients treated with ultrasound-guided intralesional triamcinolone acetonide were collected retrospectively. This treatment is routinely administered in the unit and documented in a structured medical record template with dated clinical examination. Subsequently, the information is anonymized and incorporated into a master database including all patients treated in the unit. This allows identification of the variable of interest and subsequent data collection through medical record review. The tunnels selected for the study were treated with this procedure from February 2019 through February 2022.

Conversely, data from patients treated with percutaneous galvanic current were collected prospectively. Recruitment of patients treated with percutaneous galvanic current took place from October 2022 through May 2023.

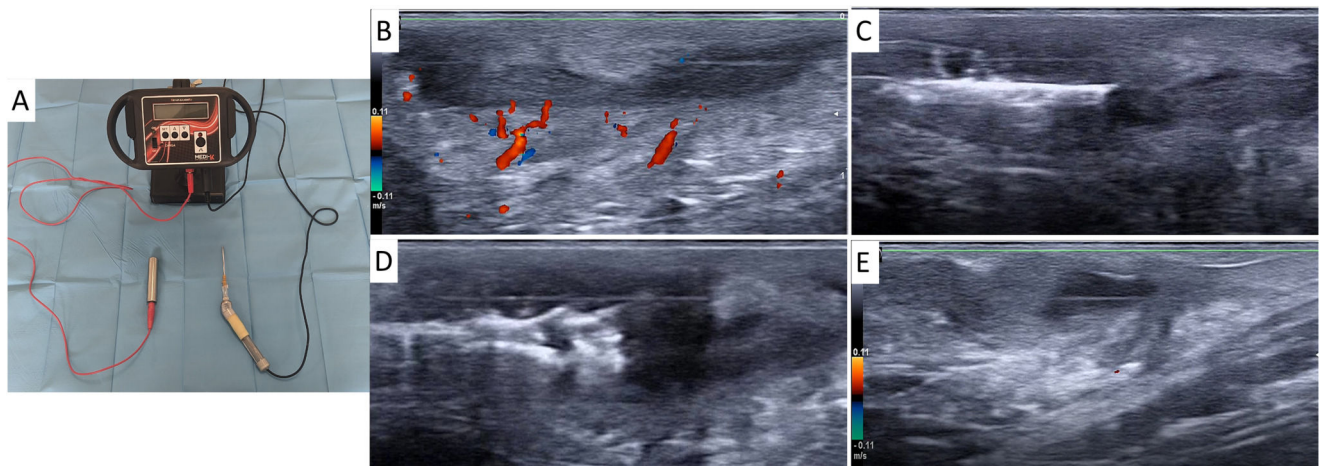
### Endpoints

The primary endpoint of the study was to compare the safety and efficacy profile of ultrasound-guided percutaneous galvanic current with ultrasound-guided intralesional administration of triamcinolone acetonide in HS tunnels. The secondary endpoint was to analyze the ability of both intralesional therapies to physically eliminate the treated tunnel by replacing it with scar tissue.

### Procedure description

**Ultrasound-guided percutaneous galvanic current:** Local tumescent anesthesia was administered in the area to be treated (100 mL of saline solution, 2 mL of 2% mepivacaine, 1 mL of 0.5% bupivacaine with epinephrine, and 2 mL of 1 molar bicarbonate). Subsequently, a 14 G Abbocath needle was inserted into the tunnel under ultrasound guidance and connected to the cathode of the CG Galvani-K<sup>®</sup> galvanic current generator (Fig. 2). While the patient held a manual anode, 5–10 cycles of GC were delivered at 5 mA, continuous, uninterrupted, with constant intensity and duration of 5 s. The Abbocath was mobilized within the lesion lumen to ensure contact with the roof, floor, and walls, being withdrawn from distal to proximal 1 cm between cycles to achieve homogeneous current administration. A second GC cycle could be administered at week 4 if complete response was not achieved.

**Ultrasound-guided triamcinolone acetonide:** A maximum of 1 mL of triamcinolone acetonide (TA) at a concentration of 40 mg/mL was administered. Injections were performed using 1-mL syringes with 21 G needles. Ultrasound guidance was used to ensure drug administration beneath the tunnel, preventing dilution of the medication within gelatinous material or purulent exudate. The syringe was withdrawn from distal to proximal in 1-cm segments between each pulse of drug administration to ensure homogeneous distribution of the active compound.



**Fig. 2.** Galvani-K<sup>®</sup> device and ultrasound-guided procedure. (A) Galvanic current generator with integrated Abbocath catheter adapter and contact electrode. (B) HS inflammatory tunnel before treatment initiation with inflammatory hyperemia identified by Doppler. (C) Abbocath catheter inserted inside the tunnel under ultrasound guidance. (D) Hyperechogenic sclerosis line after administration of galvanic current and withdrawal of the Abbocath catheter. (E) Week 12 into therapy: disappearance of inflammatory hyperemia on Doppler signal, reduction in longitudinal diameter, and decrease in perilesional edema.

In both groups, only 1 lesion per patient was treated. Ultrasound was performed using a 7–15 MHz linear probe (myLab25 Esaote Spa, Genoa, Italy) for both interventions. Before treatment administration, the area was disinfected with a 2% chlorhexidine solution.

#### Inclusion criteria

The inclusion criteria for both treatment groups were: (a) patient older than 18 years; (b) diagnosis of HS; (c) presence of a tunnel amenable to intralesional therapy based on its structural complexity assessed by ultrasound; (d) absence of systemic therapy initiated during the month prior to study inclusion; (e) signed informed consent to participate in the study.

*Selection of the lesion to be treated:* Lesion assessment was performed through physical and ultrasound examination. The tunnel had to present spontaneous pain, pain on palpation, or active drainage within 1 week prior to inclusion. If the patient presented multiple lesions fulfilling the first criterion, the following criteria were used to select the draining fistula in descending order of priority:

1. HS tunnel located in a Hurley II area vs Hurley III.
2. HS tunnel presenting a single tract vs multiple subcutaneous tracts.
3. HS tunnel without other typical disease lesions (inflammatory nodules, abscesses, other tunnels) in close proximity.
4. HS tunnel that on B-mode cutaneous ultrasound did NOT show disruption of the inferior wall – findings suggestive of instability, deep extension, and potential associated abscess formation.
5. HS tunnel considered anatomically more accessible by the investigator for performing study procedures (ultrasound evaluation and follow-up).

#### Exclusion criteria

The exclusion criteria were: (a) refusal to participate in the study; (b) systemic treatment initiated within the month prior to study inclusion; (c) surgical or intralesional treatment received within the 12 weeks preceding study initiation on the lesion of interest.

#### Ethics

This study was approved by the *Comité Ético de Investigación Provincial de Granada* (internal code 1239-N-22) and was conducted in accordance with the Declaration of Helsinki.

In patients treated with TA, general consent was obtained for the collection of routine clinical practice data, including authorization for the use of anonymized clinical data in subsequent studies.

In patients treated with GC, specific informed consent was obtained due to its experimental nature as a physical therapy. This consent included a section authorizing the use of anonymized clinical information in subsequent studies.

#### Variables of interest

*Primary efficacy variables:* Complete response: A complete treatment response was defined as the absence of spontaneous suppuration or supuration upon vigorous digital pressure during physical examination, together with the absence of Doppler signal suggestive of inflammatory activity on ultrasound, both assessed 12 weeks after treatment.

*Secondary efficacy variables:* Physical disappearance of the treated tunnel: This was defined as the absence of a draining opening or signs of active inflammation on physical examination along with the absence of ultrasound structures consistent with an inflammatory HS tunnel and soft tissue edema suggestive of inflammatory activity in the treated area. Additionally, changes in clinical variables, inflammatory activity, or disease severity (such as pain, IHS4, IHS4-55,<sup>5</sup> and Hurley stage) 12 weeks into therapy were evaluated and considered secondary efficacy variables.

*Primary safety variables:* Possible adverse effects related to the intervention were recorded and evaluated by an investigator independent of the clinician performing the therapy. The following adverse effects were predefined and coded: syncope, organ damage, nerve damage, infection of the treated area, bleeding from the treated area, development of seroma, hyperglycemia, and cutaneous atrophy. Any other event potentially associated with the intervention was additionally recorded.

*Other variables:* Sociodemographic and clinical variables were recorded for each patient, including age, sex, non-biologic systemic treatment, biologic systemic treatment, and ultrasound-measured length of the lesion to be treated. Pain was evaluated using a numerical rating scale (NRS), while overall disease severity was assessed using the Hurley staging system and the IHS4 (International Hidradenitis Suppurativa Severity Score System) formula. The IHS4-55 version was used as a secondary efficacy variable.

#### Statistical analysis

Descriptive statistics were used to evaluate the characteristics of the sample. Normality of variables was assessed using the Shapiro–Wilk

**Table 1**  
Baseline characteristics of the sample.

	Galvanic current N = 26	Triamcinolone acetonide N = 40	P
Age	35.84 (2.44)	37.8 (2)	.53
Sex			.61
Male	38.46% (10/26)	47.5% (19/40)	
Female	61.54% (16/26)	52.5% (21/40)	
<mergeline > [5pt] Longitudinal diameter	28.53 (1.62)	30.6 (1.3)	.32
Systemic treatment (non-biologic)			.01
No treatment	69.23% (18/26)	35% (14/40)	
With treatment	30.77% (8/26)	65% (26/40)	
<mergeline > [5pt] Systemic treatment (biologic)			.9
No treatment	84.6% (22/26)	82.5% (33/40)	
With treatment	15.38% (4/26)	17.5% (7/40)	
<mergeline > [5pt] Treated area			.4
Axilla	46% (12/26)	32.5% (13/40)	
Inframammary	0% (0/26)	7.5% (3/40)	
Groin	35% (9/26)	45% (18/40)	
Buttock	19% (5/26)	15% (6/40)	
<mergeline > [5pt] Hurley stage			.04
I	0% (0/26)	0% (0/40)	
II	96% (25/26)	67.5% (27/40)	
III	4% (1/26)	32.5% (13/40)	
<mergeline > [5pt] IHS4	6 (0.8)	7.7 (0.66)	.1

Continuous data are expressed as mean and standard deviation (SD), qualitative data as percentage (%) and (fraction). IHS4: International Hidradenitis Suppurativa Severity Scoring System.

test. Continuous variables are presented as mean and standard deviation (SD), and categorical variables as relative and absolute frequency distributions. The chi-square test or Fisher's exact test, as appropriate, was used to compare nominal variables, while the Student's *t* test or the Wilcoxon–Mann–Whitney test was applied to compare continuous data between two nominal groups. To explore associated factors, simple linear regression was used for continuous variables. The  $\beta$  coefficient and SD were used to predict the logarithmic probabilities of the dependent variable. Pairwise interactions between model covariates were evaluated, and potential confounding covariates were identified through changes in model parameters or a 30% variation in their value. Repeated-measures ANOVA was used to analyze differences in repeated measurements of continuous variables. Statistical significance was defined as  $P < .05$ . Statistical analyses were performed using JMP version 14.1.0 (SAS Institute).

## Results

### Descriptive study of the sample

A total of 66 patients were included, 26 treated with GC and 40 with TA. No differences were identified between groups in terms of sex, age, ultrasound lesion length, percentage of patients receiving biologic therapy, treated body areas, or baseline IHS4. The percentage of patients receiving systemic therapy with non-biologic drugs was higher in the TA group, as were baseline pain and Hurley stage (Table 1).

### Efficacy of intralesional therapies at week 12

At 12 weeks, complete clinical response (absence of suppuration + absence of Doppler inflammation) was achieved in 77.6% (20/26) of patients treated with GC and in 55% (22/40) of patients treated with TA ( $P = .07$ ). After adjustment using a multivariable model, complete response remained associated with the type of therapy applied, independently of systemic treatment, baseline IHS4, or Hurley stage.

Patients treated with GC experienced a 52.3% reduction in IHS4, whereas those treated with TA showed a 41% reduction, with no differences between groups ( $P = .38$ ). In this regard, 61.5% (16/26) of patients from the GC group and 35% (26/40) of patients treated with TA achieved IHS4-55 ( $P = .03$ ). Regarding symptomatic control, a greater reduction in pain – assessed using a visual analog scale – was observed in patients treated with GC (80.4% reduction with GC vs 22% with TA;  $P < .01$ ) (Table 2).

Lesions were evaluated by ultrasound to analyze structural changes at 12 weeks. In the GC group, 38.46% (10/26) of treated tunnels were physically eliminated, meaning that the typical ultrasound image of an HS tunnel had been completely replaced by cicatricial changes (Table 2). Patients treated with TA did not experience physical disappearance of the treated tunnel at 12 weeks ( $P < .01$ ).

### Safety of intralesional therapies at week 12

Two patients treated with GC (7.7%) developed adverse effects: one episode of bleeding and one episode of blister formation immediately after the intervention. Of note, 5 patients treated with GC (19.2%) reported a self-limited episode of tunnel inflammation within the first week after treatment, which was expected given that the mechanism of action of the therapy is based on reactivation of the NLRP3 inflammasome. Among the 5 patients who developed a post-treatment flare, 4 achieved complete clinical response.

In the TA group, 4 of 40 patients (10%) experienced adverse effects: 3 (7.5%) developed cutaneous atrophy and 1 (2.5%), hyperglycemia (Fig. 3).

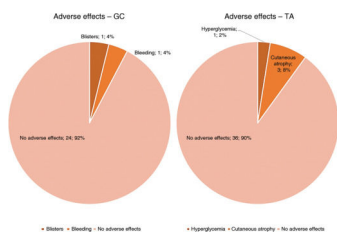
## Discussion

In this study, a total of 66 patients were included, 26 of whom received GC and 40, TA. At the 12-week follow-up, a complete response rate of 77.6% was observed in patients treated with GC compared with 55% in those treated with TA. In addition, treatment with GC demonstrated greater pain reduction and a greater capacity for lesion elimination th-

**Table 2**  
Primary and secondary efficacy variables obtained with each therapy.

	Galvanic current N = 26	Triamcinolone acetonide N = 40	P
Complete response (week 12)			.07
Yes	77% (20/26)	55% (22/40)	
No	23% (6/26)	45% (18/40)	
<mergeline> [5pt] <i>Ultrasound elimination of the tunnel</i>			<.01
Yes	38.46% (10/26)	0% (0/40)	
No	61.54% (16/26)	100% (40/40)	
<mergeline> [5pt] <i>IHS4</i>			.38
Baseline	6 (0.8)	7.7 (0.66)	
Week 12	2.4 (0.46)	4.6 (0.7)	
% reduction	52.3%	41%	
<mergeline> [5pt] <i>IHS4-55</i>			.03
Yes	61.5% (16/26)	35% (26/40)	
No	38.5% (10/26)	65% (14/40)	
<mergeline> [5pt] <i>Pain (VAS)</i>			<.01
Baseline	3.1 (0.64)	5.2 (0.5)	
Week 12	0.6 (0.37)	4 (3.5)	
% reduction	80.4%	22%	

VAS: visual analog scale; IHS4: International Hidradenitis Suppurativa Severity Scoring System.



**Fig. 3.** Adverse effects observed with each therapy from 48 h to 12 weeks into therapy.

rough fibrotic collapse, evidenced by the disappearance of the lesion on cutaneous ultrasound. In terms of safety, no significant differences were found in the rate of adverse events between the groups on GC and TA. Baseline sociodemographic and clinical characteristics were comparable to those reported in previous studies with similar designs.<sup>11,18,19</sup>

The results of the present study suggest that GC has similar efficacy to ultrasound-guided intralesional TA in controlling symptoms and a greater capacity to physically eliminate the treated tunnel. The efficacy results obtained for TA are consistent with those of a prospective study applying the same criteria for complete response and administering treatment under ultrasound guidance, which reported a complete response rate of 53.33% (32/60) in draining tunnels at 12 weeks of treatment (up to 5 infiltrations).<sup>11</sup> In that study, a higher complete response rate was observed in lesions receiving concomitant treatment.<sup>11</sup> However, in our study, a higher percentage of complete responses was achieved with GC despite the fact that this group had a lower proportion of patients on concomitant systemic therapy than those on TA. A systematic review including 7 studies evaluating intralesional corticosteroid therapy reported complete resolution of infiltrated lesions in 44–70% of cases.<sup>10</sup> However, the subtype of lesion treated was not specified (inflammatory nodules and abscesses were included in the samples), and heterogeneity in response criteria prevented meta-analysis.<sup>10</sup> Variability in response criteria and heterogeneity of the evidence make comparisons with other studies difficult. For example, a double-blind, randomized, placebo-controlled trial comparing intralesional triamcinolone 10 mg/mL, triamcinolone 40 mg/mL, and normal saline found no significant differences between treatment groups.<sup>20</sup>

The proportion of patients achieving IHS4-55 was higher in the GC group, although no differences were observed in IHS4 reduction at week 12. When interpreting these effectiveness figures, it is important

to consider the type of patient included in this study, who generally had moderate disease with a baseline IHS4 between 6 and 7. In these patients, control of a single tunnel may result in a marked reduction in IHS4, which reduces the likelihood of detecting differences between groups.

Complete fibrosis was observed in some tunnels treated with GC, whereas elimination of the treated lesion was not achieved in the TA group. Tunnel collapse due to fibrosis has been proposed as a mechanism of action in some observational studies with intralesional triamcinolone<sup>11,18</sup>; however, these studies did not describe this phenomenon nor the ultrasound disappearance of the tunnel structure in their samples.<sup>11,18</sup> This finding represents an additional advantage of percutaneous electrolysis, as it addresses the therapeutic need to physically eliminate HS tunnels, which is usually achieved only through surgery. It should be remembered that the development of inflammatory flares in patients with HS receiving biologic systemic therapy is partly explained by the permanent nature of fistulous structures.

In terms of safety, no serious or irreversible systemic adverse effects were reported in either group, although reversible systemic effects were observed in the TA group (hyperglycemia). Other studies have reported systemic adverse effects associated with intralesional triamcinolone acetonide (hyperglycemia, behavioral changes),<sup>11</sup> and skin atrophy resulting from intralesional corticosteroid therapy is a widely reported adverse effect.<sup>10,21</sup> Nevertheless, intralesional corticosteroid therapy can generally be considered safe, and the occurrence of severe adverse events is uncommon.<sup>10,21</sup> Of note, patients on GC relatively frequently developed inflammatory flares 1 week after treatment. This event can be considered intrinsic to the mechanism of action of the therapy, which requires IL-1 $\beta$  release before fibrosis generation. In fact, these patients often achieved complete response by week 12, although this association could not be demonstrated as statistically significant due to the limited statistical power resulting from the small sample size.

The present study provides data on the safety and efficacy profile of a novel intralesional therapeutic alternative in HS, using an observational design comparing results with those obtained using ultrasound-guided intralesional corticosteroid therapy. Both groups were comparable in numerous baseline sociodemographic and clinical variables, both procedures were performed under ultrasound guidance, and follow-up periods allowed assessment of medium-term outcomes. However, the limited statistical power hindered the detection of statistically significant differences in the primary outcome variable. The use of a single TA infiltration may have underestimated the proportion of complete res-

ponses at 12 weeks in this group. The use of retrospective data may also have been a source of selection bias. Additionally, the added value of ultrasound guidance could not be assessed because it was used in both treatment groups.

In conclusion, ultrasound-guided percutaneous GC may represent a treatment alternative that is at least as effective as ultrasound-guided intralesional corticosteroid therapy while offering greater capacity for physical elimination of the treated lesion. Furthermore, it may be considered a safe therapy with low potential for systemic adverse effects. Future studies evaluating its efficacy in clinical trials are awaited, as well as investigations into the prognostic value of inflammatory flares occurring between treatment cycles.

### Conflict of interest

The authors declare no conflict of interest.

### References

- Nguyen TV, Damiani G, Orenstein LAV, Hamzavi I, Jemec GB. Hidradenitis suppurativa: an update on epidemiology, phenotypes, diagnosis, pathogenesis, comorbidities and quality of life. *J Eur Acad Dermatol Venereol*. 2021;35:50–61, <http://dx.doi.org/10.1111/jdv.16677>.
- van Straalen KR, Prens EP, Gudjonsson JE. Insights into hidradenitis suppurativa. *J Allergy Clin Immunol*. 2022;149:1150–1161, <http://dx.doi.org/10.1016/j.jaci.2022.02.003>.
- Vossen ARJV, van der Zee HH, Prens EP. Hidradenitis suppurativa: a systematic review integrating inflammatory pathways into a cohesive pathogenic model. *Front Immunol*. 2018;9:2965, <http://dx.doi.org/10.3389/fimmu.2018.02965>.
- Witte-Händel E, Wolk K, Tsaousi A, et al. The IL-1 pathway is hyperactive in hidradenitis suppurativa and contributes to skin infiltration and destruction. *J Invest Dermatol*. 2019;139:1294–1305, <http://dx.doi.org/10.1016/j.jid.2018.11.018>.
- Świerczewska Z, Lewandowski M, Surowiecka A, Barańska-Rybak W. Microbiome in hidradenitis suppurativa – what we know and where we are heading. *Int J Mol Sci*. 2022;23, <http://dx.doi.org/10.3390/ijms231911280>.
- Nazzaro G, Passoni E, Calzari P, Marzano AV. Ultrasonographic assessment of fibrosis in hidradenitis suppurativa fistulae helps in addressing treatment. *Ski Res Technol*. 2020;26:445–446, <http://dx.doi.org/10.1111/srt.12805>.
- Glatt S, Jemec GBE, Forman S, et al. Efficacy and safety of bimekizumab in moderate to severe hidradenitis suppurativa: a phase 2, double-blind placebo-controlled randomized clinical trial. *JAMA Dermatol*. 2021;157:1279–1288, <http://dx.doi.org/10.1001/jamadermatol.2021.2905>.
- Kimball AB, Jemec GBE, Alavi A, et al. Secukinumab in moderate-to-severe hidradenitis suppurativa (SUNSHINE and SUNRISE): week 16 and week 52 results of two identical, multicentre, randomised, placebo-controlled, double-blind phase 3 trials. *Lancet (London, England)*. 2023;401(10378):747–761, [http://dx.doi.org/10.1016/S0140-6736\(23\)00022-3](http://dx.doi.org/10.1016/S0140-6736(23)00022-3).
- Zouboulis CC, Desai N, Emtestam L, et al. European S1 guideline for the treatment of hidradenitis suppurativa/acne inversa. *J Eur Acad Dermatol Venereol*. 2015;29:619–644, <http://dx.doi.org/10.1111/jdv.12966>.
- Cuenca-Barrales C, Montero-Vilchez T, Sánchez-Díaz M, et al. Intralesional treatments in hidradenitis suppurativa: a systematic review. *Dermatology*. 2022;238:1084–1091, <http://dx.doi.org/10.1159/000524121>.
- Salvador-Rodríguez L, Arias-Santiago S, Molina-Leyva A. Ultrasound-assisted intralesional corticosteroid infiltrations for patients with hidradenitis suppurativa. *Ski Rep*. 2020;10, <http://dx.doi.org/10.1038/s41598-020-70176-x>, 13363.
- Peñín-Franch A, García-Vidal JA, Martínez CM, et al. Galvanic current activates the NLRP3 inflammasome to promote Type I collagen production in tendon. *Elife*. 2022;11, <http://dx.doi.org/10.7554/eLife.73675>.
- Abderrazak A, Syrovets T, Couchie D, et al. NLRP3 inflammasome: from a danger signal sensor to a regulatory node of oxidative stress and inflammatory diseases. *Redox Biol*. 2015;4:296–307, <http://dx.doi.org/10.1016/j.redox.2015.01.008>.
- García-Vidal JA, Salinas J, Ortega N, Escolar-Reina P, Camacho-Alonso F, Medina-Mirapeix F. In vitro bacteriological effect of tri-beveled needle electrolysis against *Staphylococcus aureus*. *Sci Rep*. 2022;12, <http://dx.doi.org/10.1038/s41598-022-15666-w>, 11468.
- García-Vidal JA, Salinas J, Escolar-Reina P, et al. Galvanic current dosage and bacterial concentration are determinants of the bactericidal effect of percutaneous needle electrolysis: an in vitro study. *Sci Rep*. 2021;11, <http://dx.doi.org/10.1038/s41598-021-98451-5>, 18977.
- Soto-Moreno A, Cuenca-Barrales C, Arias-Santiago S, García-Vidal JA, Medina-Mirapeix F, Molina-Leyva A. Safety and effectiveness of percutaneous ultrasound-guided galvanic current in tunnels of patients with hidradenitis suppurativa: a pilot study. *Dermatol Ther (Heidelb)*. 2024;14:1115–1125, <http://dx.doi.org/10.1007/s13555-024-01149-5>.
- Berná-Serna JdD, García-Vidal JA, Escolar-Reina MP, et al. A new treatment for mammary fistulas using ultrasound-guided percutaneous needle electrolysis. *J Clin Med*. 2020;9, <http://dx.doi.org/10.3390/jcm9030649>.
- García-Martínez FJ, Vilarrasa Rull E, Salgado-Boquete L, et al. Intralesional corticosteroid injection for the treatment of hidradenitis suppurativa: a multicenter retrospective clinical study. *J Dermatolog Treat*. 2021;32:286–290, <http://dx.doi.org/10.1080/09546634.2019.1655524>.
- Fania L, Clemente A, Sampogna F, et al. Intralesional ultrasound-guided combined treatment with triamcinolone plus lincomycin in hidradenitis suppurativa: a pilot study. *Dermatol Ther*. 2020;33, <http://dx.doi.org/10.1111/dth.13901>, e13901.
- Fajgenbaum K, Crouse L, Dong L, Zeng D, Sayed C. Intralesional triamcinolone may not be beneficial for treating acute hidradenitis suppurativa lesions: a double-blind, randomized placebo-controlled trial. *Dermatol Surg*. 2020;46:685–689, <http://dx.doi.org/10.1097/DSS.0000000000002112>.
- Pascual JC, Hernández-Quiles R, Sánchez-García V, Viudez-Martínez A, Belinchón I, Sivera F. Topical and intralesional therapies for hidradenitis suppurativa: a systematic literature review. *Actas Dermosifiligr*. 2023, <http://dx.doi.org/10.1016/j.ad.2023.12.001>.