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Authors

Galet, Colette
Torres, Marlon
Wibbenmeyer, Lucy
et al.

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Evaluation of Outcomes Following Surgical Treatment of Hidradenitis Suppurativa

Kathleen S. Romanowski, MD, FACS,[*,†] Colette Galet, PhD,[*] Marlon Torres, MD,[*,‡] and Lucy Wibbenmeyer, MD, FACS[*]

ABSTRACT

Hidradenitis suppurativa (HS), a chronic disease of the apocrine bearing skin causing induration, pain, draining sinuses, and subcutaneous abscesses, significantly impairs patients' quality of life (QOL). Full-thickness excision followed by skin grafting of the involved area can be curative. Herein, we evaluated the impact of this surgical treatment on QOL and depression symptomatology. Adult patients (≥18 years) who consented to participate filled out the dermatology quality of life (DLQI) and the Patient History Questionnaire (PHQ-9) at consent and at 1, 6, and 12 months post-initial evaluation and surgery. Demographics, HS, admission, and operative information were collected. Sixteen patients were included. Subjects were mainly white (81.3 %) and female (56.3%) with a median age of 38.2 (Interquartile range: 34.2–54.5); 62.5% were obese (BMI= 39.7 [28.4–50.6]). Half of the subjects presented with HS in 2 or more areas. Six patients were still undergoing surgeries at 6 months. One-, six-, and 12-month follow-up surveys were obtained from 14, 11, and 8 subjects for DQLI and from 14, 9, and 5 subjects for PHQ9. DLQI scores significantly decreased at 6 months compared to baseline, which indicates QOL improvement (10 [4–20] vs 15.5 [12–21.8], $P = .036$). Although not significant, PHQ9 scores tended to decrease. For those with the worst disease, DLQI significantly decreased at both 6 ($P = .049$) and 12 months ($P = .047$) compared to baseline. Despite a small sample size, our data suggest that aggressive surgical treatment improves the QOL of HS patients. Further studies are warranted to confirm our findings.

Hidradenitis suppurativa (HS) is an unrelenting disease with recurrent abscesses involving sebaceous glands in hair-bearing areas, namely the axilla, groin, perianal area, breasts, and panniculus.[1,2] HS usually begins during teenage years and is often initially addressed with emergent incision and drainage and antibiotics.[3] Management of HS can be either medical or surgical.[4] In the early stages of the disease, medical management is usually the treatment of choice, and first-line medications are typically antibiotics, both oral and topical. As the HS progresses, the medical treatment expands to involve immunomodulatory therapy. Once the disease advances, surgical management becomes necessary and can offer definitive treatment if complete excision is performed.

There are multiple surgical techniques that can be used for HS, including incision and drainage of abscesses, unroofing of lesions, localized excision, and extensive excision of all hair-bearing skin with a variety of methods used for reconstruction.[5–7] However, all surgical procedures, short of extensive excision and either split-thickness skin graft or flap closure, have an unacceptably high recurrence rate.[8] We have previously published our results utilizing a two-stage complete excision of HS and skin grafting involving 99 patients.[9] Our results showed few complications, a regrafting rate of less than 10%, and 94.7% of all wounds were fully grafted and closed 30 days after initial surgery, suggesting that this is a safe and effective treatment for HS.

Beyond physical symptomatology such as pain, recurrent infections, and drainage, HS can be debilitating due to its relapsing and remitting course. In fact, physical symptoms, but not clinical disease severity assessed by Hurley Staging, have been better correlated with QOL.[10] Secondary to these factors, HS has been associated with anxiety, depression, sexual dysfunction, body image issues, and difficulty with employment. These issues can profoundly impair patients' well-being as well as their perceived health-related quality of life (QOL).

Various methods have been used to measure QOL and well-being. The Dermatology Life Quality Index (DLQI) is designed to measure health-related QOL in patients over the age of 16 years who are suffering from a skin disease and has become the most frequently used method for evaluating QOL for patients with skin conditions.[11] In a 114-patient study group, Von Der Werth et al.[12] revealed that QOL was worse than that for other dermatologic conditions such as alopecia, acne, psoriasis, and atopic dermatitis. This was particularly true on questions measuring the level of pain, itching, and soreness. Even though HS leads to poor DLQI scores, there have not been many studies examining the

From the [*]Acute Care Surgery Division, Department of Surgery, University of Iowa, Iowa City, IA 52242, USA; [†]Present address: Shriners Hospitals for Children Northern California, 2425 Stockton Blvd. Suite 718, Sacramento, CA 95817, USA; [‡]Present address: Long-Island Medical School, New York University, NYU Langone Health, 101 Mineola Blvd, Mineola, NY 11501, USA

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Address correspondence to Colette Galet, PhD, Acute Care Surgery Division, Department of Surgery, University of Iowa, 200 Hawkins Drive, Iowa City, Iowa 52242, USA. Email: colette-galet@uiowa.edu

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effects of surgical treatment on QOL. Published studies vary in their conclusions with some showing improved QOL and others showing worse QOL depending on the type of operation that was conducted.[13–18] Although all but one used the DLQI tool, the variability in the surgical procedures and study design make it difficult to determine the best treatment option.

Well-being, such as depressive symptomatology, as assessed by the Patient History Questionnaire (PHQ-9) has not previously been studied in an HS surgical cohort. HS patients have a high incidence of both anxiety and depression at baseline.[10,19] PHQ-9 offers a simple depression symptomatology screening that is valid in other populations such as psychiatric patients and patients with a variety of medical co-morbidities.[20–22] In a primary care population, higher PHQ-9 scores have been associated with a decreased functional status that could be an additive insult for those inflicted with HS.[23]

Herein, we sought to examine the longitudinal changes in QOL and depressive symptoms that occurred within a year following treatment. Our goal was to better understand the effects of wide-excision and subsequent skin grafting of HS so that we can better counsel patients on the best treatment options, given their affected site and stage of disease. We hypothesized that patients would have improved QOL and decreased depressive symptoms following their surgical procedures and that this improvement would be sustained over the course of a year due to the low rate of symptom recurrence following surgical treatment using our operative technique.

METHODS

Ethical Statement

This study was conducted after the approval of our Institutional Review Board (IRB # 201608812). Participants were consented and enrolled upon presentation to our institution after determining that they met inclusion criteria and then prospectively observed for 1 year following discharge.

Inclusion and Exclusion Criteria

Patients aged 18 years and older who presented to the burn center for the treatment of HS with Hurley Stage II or III disease and who opted for surgical management were approached. Surgical management and criteria for surgical management have been previously described.[9] Briefly, surgery is completed in two stages. The patient undergoes excision of the affected area which is then grafted within 48 hours. The patient is given preoperative antibiotics prior to each operation. Immunosuppressive agents are usually stopped 2 weeks prior to operative intervention otherwise wound care remains unchanged. The wounds are usually dressed in a topical antimicrobial slurry solution post-operatively with dressings changed in 48–72 hours postoperatively. Ambulation is allowed immediately after nongroin surgery and 3–5 days after groin, perineum, or buttock surgery. The axilla is braced for 2 weeks postoperatively. Our center operates on anyone who met our criteria, for example, anyone able to abide by our post-operative instructions and have a caregiver who can help them during their recovery.

Prisoners, pregnant women, and adults who may be incompetent or have limited decision-making capacity on initial enrollment into the study were excluded. Subjects who agreed to participate in our study filled out the dermatology quality of life (DQLI)[11] and the patient health questionnaire (PHQ-9)[24] at the time of consent and at 1, 6, and 12 months post initial evaluation and surgery. The higher the DQLI or the PHQ-9, the worse the impairment in QOL or depression symptomatology, respectively.

Questionnaires

PHQ-9 is a subset of 9 questions from the full PHQ that was initially developed by Kroenke et al[23] with each item being scored as "0" (not at all) to "3" (nearly every day) leading to a total score with a range from 0 (no evidence of depression) to 27 (severe depression). The developers found that PHQ-9 scores ≥10 were 88% sensitive and 88% specific for detecting depression symptomatology.

DLQI consists of 10 questions ascertaining patients' perception of the impact of skin diseases on different aspects of their QOL such as symptoms, social life, work life, close relationships, and sex over the week prior to questionnaire administration. The DLQI score is calculated by summing the score of each question resulting in a score ranging from 0 (no effect at all on patient's life) to 30 (extremely large effect on patient's life).

Table 1. Patient characteristics

Variables	Statistics
Age, y, median (IQR)	38.2 (34.2–54.5)
Gender, *n* (%)	
Female	9 (56.32)
Race, *n* (%)	
White	13 (81.3)
African American	1 (6.3)
Hispanic	2 (12.5)
Employment, *n* (%)	8 (50)
Insurance, Public, *n* (%)	11 (68.8)
BMI, median (IQR)	39.7 (28.4–50.6)
Years with HS, y, median (IQR)	10 (1–19)
Comorbidity, *n* (%)	
Obesity	10 (62.5)
Psychiatric condition	7 (43.8)
Current/former smoker	7 (43.8)
Hypertension	7 (43.8)
Diabetes	4 (25)
Others (HLD, PCOS, arthritis, etc.)	13 (81.3)
Substance abuse	1 (6.3)
Prior treatment for HS, *n* (%)	
Antibiotics	12 (75)
Incision and drainage	12 (75)
Immunosuppressives	2 (12.5)
Topical antibiotics	3 (18.8)
Excision and grafting	7 (43.8)
Other	1 (6.3)

HS, Hidradenitis suppurativa; *HLD*, Hyperlipidemia; *PCOS*, Polycystic Ovarian Syndrome.

Table 2. Hidradenitis suppurativa location and Hurley Stage on admission and hidradenitis sites surgically treated at each admission for surgical treatment during the study period

		Hidradenitis suppurativa location and stage on initial admission													HS site treated at each admission for surgery		
Study ID	Number of sites	Neck	Hurley Stage	Axilla	Hurley Stage	Trunk	Hurley Stage	Breast	Hurley Stage	Buttock	Hurley Stage	Groin and perineum	Hurley Stage	Other	First	Second	Third
2*	1	0		0		0		0		0		1	2	0	Groin/thighs		
9*	1	0		1	3	0		0		0		0		0	Left axilla		
16	1	0		1	2	0		0		0		0		0	Right axilla	Left axilla	
17*	1	0		1	2	0		0		0		0		0	Right axilla		
18**	1	0		0		0		0		1	3	0		0	Buttock	Groin/thighs	
20**	1	0		0		0		0		1	3	0		0	Groin/thighs	Buttock	
21*	1	0		1	2	0		0		0		0		0	Left axilla		
22*	1	0		0		0		0		0		1	3	0	Groin/thighs		
6*	2	0		1	3	0		0		0		1	2	0	Left axilla/ groin/ thighs	Left axilla/ groin/ thighs	
7	2	0		1	3	0		0		0		1	3	0	Right axilla/ groin/ thighs	Groin/thighs	Right axilla
12	2	0		0		0		0		0		1	2	1	Left axilla		
15**	2	0		1	3	0		1	3	0		0		0	Left axilla	Right axilla	Breast
23**	2	0		0		0		0		1	3	0		1	Buttock	Groin/thighs	
1*	3	0		1	2	0		1	2	0		0		1	Right axilla		
4*	3	0		0		0		1	3	1	2	1	3	0	Groin/thighs/ breast/ panniculus	Groin/thighs/ perineum/ breast/trunk	Groin/thighs/ breast/ trunk
5**	4	1	1	0		1	2	1	2	0		1	2	0	Groin/thighs/ breast	Groin/thighs/ breast	Breast

*All surgeries were completed within 6 months of the study period.
**All surgeries were completed within 12 months of the study period.

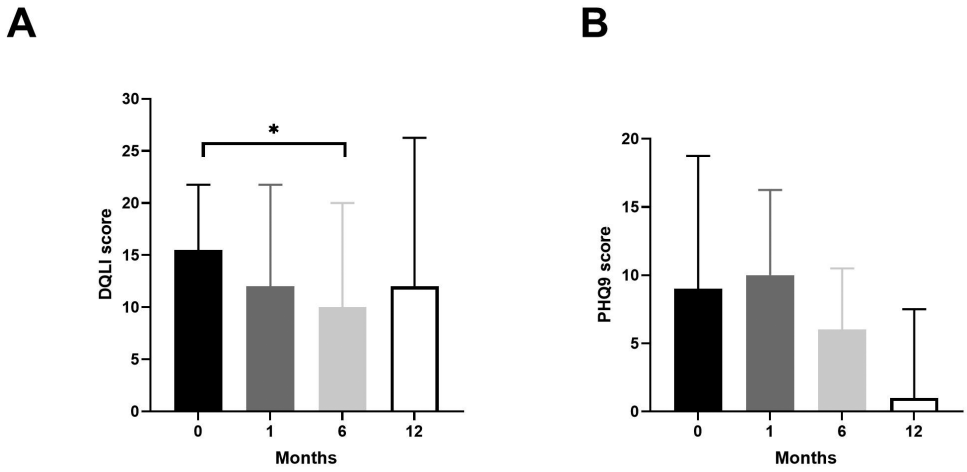

Figure 1. DQLI and PHQ9 scores recorded at baseline, 1, 6, and 12 months. Data are presented as median and interquartile ranges. $^{*}P < .05$.

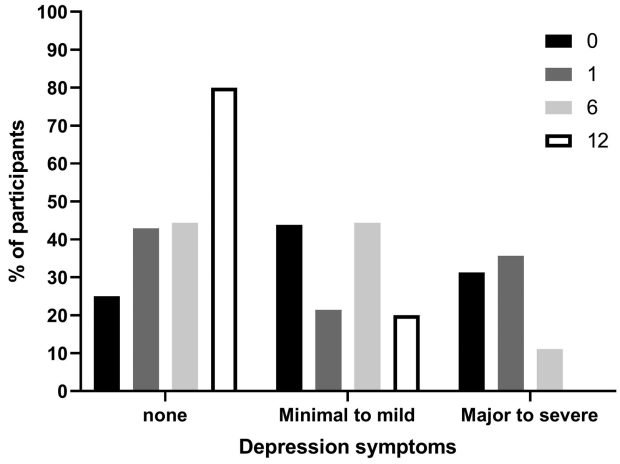

Figure 2. Distribution of participants presenting none, minimal-to-mild, or major-to-severe depression symptoms at baseline, 1, 6, and 12 months.

Data Collection

Demographics (age, sex, self-reported race, co-morbidities, psychiatric conditions, occupation, BMI); HS data (HS location, axillary laterality, Hurley Stage); admission data (length of stay, and number of admissions); and operative information were collected from the subjects' medical records.

Statistical Analysis

Normality was assessed using the Kolmogorov–Smirnov normality test. For continuous variables, data are presented as median and interquartile. Categorical variable data are presented as number of patients in each category and percentage. ANOVA, paired sample *t*-test, Mann–Whitney *U* test, and correlation were performed as appropriate using SPSS 28.0 (IBM SPSS, Chicago, IL) and correlation between DQLI and PHQ9 scores was assessed using the Spearman coefficient. Figures were prepared using the GraphPrism software package (GraphPrism, San Diego, CA, USA). $P < .05$ was considered significant.

RESULTS

Patient Characteristics

Twenty-one patients were enrolled in this study. Sixteen patients underwent surgery and were included in the analysis. As shown in Table 1, on average, patients who underwent surgery were in their late 30s, white, female, and obese. The median length of time with HS was 10 years. Twelve participants presented with 2 or more comorbidities, 3 with 1, and 1 participant had no comorbidities. Obesity was the most reported comorbidity followed by psychiatric conditions with depression and anxiety being the most frequent, followed by smoking, hypertension, and diabetes. All participants had prior treatment for HS, most of them received antibiotics or underwent incision and drainage or excision and grafting prior to this study. Of the 7 participants who underwent excision and grafting prior to this study, 4 were previously treated at our burn center with excision and grafting on other areas 1 to 5 years before this study was conducted. They consulted the Burn center requesting the same treatment on HS in other areas that remained a problem despite using oral or topical antibiotic or immunosuppressive agents. The other 12 patients were referred to us by Dermatology services either at our institution or outside of our institution.

Hidradenitis Suppurativa Information and Surgical Treatment

As shown in Table 2, 8 participants presented with HS in only one location, 5 with 2, 2 with 3, and 1 with 4 body locations. Eight participants presented with HS involving the axilla with 50% presenting with Hurley Stage III disease. Seven participants presented with HS involving the groin and perineum with 57.1% presenting with Hurley Stage II disease. Four participants presented HS involving the buttocks with 75% presenting Hurley Stage III disease. Four participants presented with HS involving the breast with 50% presenting with Hurley Stage III disease. One presented with Hurley Stage III disease involving the trunk and one presented with Hurley Stage I disease involving the neck. Three participants

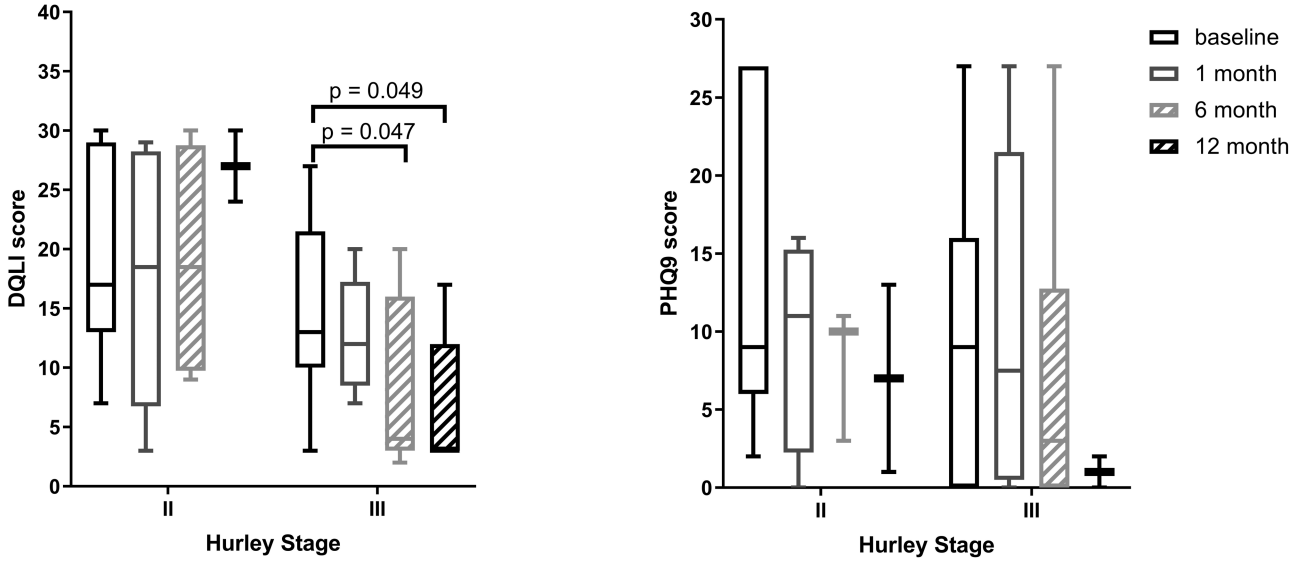

Figure 3. DQLI and PHQ9 scores recorded at baseline, 1, 6, and 12 months based on Hurley stages.

presented with HS on other locations, including the panniculus and perianal area.

On their initial surgery, most patients underwent excision (n =13) followed by a second surgery involving re-excision and autografting (n = 11). The other three patients underwent incision and drainage of an abscess on their first surgery followed by excision on their second surgery and re-excision and autografting on their third surgery. The median number of surgical treatments was 2.5 [2–5.8].

Ten patients (62.5%) completed all their surgeries within the first 6 months of this study. Five had surgeries on the axilla, 2 on the groin/thigh, 2 on both the axilla and the groin/thigh, and 1 on the axilla, groin/thigh, and panniculus. The remaining 6 were still undergoing surgery up to the 12 months post-enrollment mark. Two underwent surgery on the axilla, 2 on the groin/thigh and buttock, 1 on the groin/thigh and breast, and 1 on the axilla, groin/thigh, buttock, and trunk.

Over the 12-month study period, autografting was performed on 14 participants, 20% graft loss was noted for 4 participants; however, no regrafting was necessary. No recurrence was observed during the study period.

Impact of Care on Quality of Life and Depression Measures

All 16 participants filled out the DQLI survey at baseline, 14 filled it out at 1 month, 11 at 6 months, and 8 at 12 months. Figure 1A depicts the median and interquartile for the DQLI scores. Paired sample t-test showed a significant improvement in QOL (decrease in score) between the baseline and 6 months scores (15.5 [12–21.8] vs 10 [4–20], P = .036). No significant differences were observed between the baseline and 12 months; (15.5 [12–21.8] vs 12 [3–26.3], P = .311) or between the 6 months and 12 months scores (10 [4–20] vs 12 [3–26.3], P = .659).

All participants filled out the PHQ9 survey at baseline, 14 filled it out at 1 month, 9 at 6 months, and 5 at 12 months. Figure 1B depicts the median and interquartile ranges for the PHQ9 scores. Although median PHQ9 scores tended to decrease, no significant differences were observed between scores obtained at baseline, 1, 6, and 12 months.

As shown in Figure 2, of the participants who answered the PHQ9, the percentage of participants showing no signs of depression tended to increase at 1 and 6 months. The percentage of subjects who presented major to severe signs of depression tended to decrease at 6 months. Only 5 patients filled out the PHQ9 survey at 12 months and none of them showed major to severe signs of depression.

As shown in Figure 3, when we grouped patients based on their highest Hurley Stage of HS, DQLI scores did not change significantly overtime for patients with Hurley Stage II HS. However, for patients with Hurley Stage III HS, DQLI scores at 6 and 12 months decreased significantly compared with their baseline scores. No significant change in PHQ9 scores was observed for both patients with Hurley Stage II and III HS.

Spearman correlation analysis showed no significant correlation between history of HS and PHQ9 or DQLI scores at baseline, 1, 6, and 12 months. However, DQLI and PHQ9 positively correlated (R^2 = 0.659, P < .001).

DISCUSSION

HS is a debilitating and progressive disease of the apocrine skin glands and associated hair follicles that has profound effects on sleep, daily activities, mental health, and sexual health severely impacting QOL. This prospective study extends the literature showing the positive impact of aggressive surgical resection with skin graft reconstruction on QOL and depressive symptomatology in a small cohort of patients for whom non-surgical approaches have failed. As surgery can offer definitive treatment for HS, this paper lends support to this simple technique in patients with severe, advanced, symptomatic disease and supports its potential positive impact on QOL and depressive symptoms.

With a point prevalence of 0.1–1.0%, HS remains an orphan disease.[25,26] Its rarity undoubtedly contributes to its long latency from symptom onset to treatment, not uncommonly stretching over a decade.[25] As this disease appears to be hormonally influenced, patients are typically young when first afflicted, often during the formative adolescent years. As disease progresses from single pustules (Hurley Stage I) to multiple ropelike lesions with sinus tracks and fistulas (Hurley Stage III), so does the symptomatology and the treatment.[7,27] Symptoms include pain, foul smelling copious drainage, depression, scarring, insomnia, anxiety, and distress. Scales that measure physiologic disease severity (drainage and pain) of the disease correlate with depression and QOL.[10] Among dermatologic diseases such as psoriasis, atopic dermatitis, alopecia, and acne, HS is reported to be the most impactful on QOL.[10,12] Using a generic instrument (15-dimension QOL questionnaire) for comparison to other populations, QOL in a 92 patient sample was similar to non-aged matched patients suffering from metastatic breast and prostate cancer.[10] Similar to what we previously reported, in addition to a lower QOL, HS patients have a high rate of depression and anxiety and other psychiatric issues.[9,10,19] Recognition and treatment of this disease is imperative for the well-being of those afflicted.

Fortunately, previous dermatologic studies have shown improvements in QOL and mental health issues with medical treatment.[26,28] In a randomized placebo-controlled study of 38 patients, Miller et al[26] showed significant declines in disease intensity as well as improvements in QOL. These results were achieved with a good safety profile. Unfortunately, medical treatment provides, at best, suspension of the disease. As this is a chronic condition, continued treatment with immunosuppressive therapies or biologics is necessary for disease remission. As disease progresses, medical treatment is less effective.[29]

Although medical treatment helps control early stage disease, surgical treatment provides the only definitive treatment for advanced recalcitrant disease.[27,30] Surgical options range from laser ablation, to simple excision, to complete excision with skin graft or flap reconstruction.[9,15,17,31–33] Radical surgery with skin graft or flap reconstruction has been associated with minimal complications and recurrence and with >80% of the patients satisfied or willing to recommend the procedure.[15–17,32,34]

Surgical treatment has also been associated with improvement in well-being. Although we previously reported successful treatment with wide excision and skin graft reconstruction on 99 patients, its retrospective design prohibited us from assessing impacts on mental health or QOL.[9] Employing wide location excision but different reconstructive techniques, Posch et al and Marchesi et al both showed significant improvement in QOL as measured by the DLQI; however, in the former, they allowed the wounds to heal by secondary intention and in the latter they performed complex flap closure.[16,17] Delayed secondary closure requires more wound care and painful dressing changes. On the other hand, flap closure requires expertise. In the current study, using wide local excision and split thickness skin grafting, we were also able to show a significant improvement in DLQI measured QOL scores from enrollment to 6 months. Moreover, there was a significant improvement in QOL for those with more advanced disease (Hurley Stage III). This occurred even though 6 patients were still undergoing surgery for symptomatic disease. However, no surgical study to date has assessed the impact of intervention on depression. A consensus conference recommended depression screening as HS patients have a high rate of depression as well as other mental health disorders.[35] Although in the current study, depression symptomatology improved as measured by the PHQ-9, it did not reach statistical significance.

Several limitations to this study bear mentioning. This is a small heterogeneous sample of patients from a single institution and may not be representative of all patients with HS. The patients were at various stages of surgical treatment of their disease. Some had completed excision of their disease and others were still undergoing surgical excision of active disease as the questionnaires were being administered. Ideally, the surveys should have been timed appropriately or patients with only one diseased site should have been enrolled. Despite this, we were able to show QOL improvements and a decrease in depressive symptomatology in the current study. Another limitation is the attrition of patients with less than half completing DLQI and only 5 completing PHQ-9 at 12 months. Finally, these instruments were self-reported and, thus, there may be a bias of only patients reporting improvements completing the questionnaires.

CONCLUSION

We report improved DLQI and a decrease in depressive symptomatology in a small cohort of patients undergoing wide excision and skin graft resurfacing. While these results should be replicated in a larger study, they provide the basis for recommendation of this simple procedure in patients afflicted with HS, particularly with symptoms affecting quality of life and mental health.

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