

Post-surgical recurrence of hidradenitis suppurativa: key risk factors and predictive insights

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Background: Hidradenitis suppurativa (HS) is a chronic dermatological condition of uncertain etiology, high recurrence rates, and significant impacts on quality of life. Surgical treatment is commonly employed; however, recurrence remains a major concern. This study investigated the recurrence rates and factors influencing recurrence following surgical intervention in patients with HS.

Methods: This retrospective study analyzed patients diagnosed with HS who underwent surgical treatment at Razi Hospital in Tehran during 2022 and 2023. Data on demographics, clinical features, surgical techniques, and recurrence rates were collected. Recurrence was defined as the reappearance of lesions at the same or different anatomical sites during follow-up.

Results: Among 18 patients, the mean age was 31 ± 10.8 years, and 65% were men. The mean body mass index (BMI) was 31 ± 7.5 . The axilla was the most commonly affected site. The overall recurrence rate was 27.7%, with significantly higher recurrence rates in the perineum and breast (100%) compared to the axilla (16.7%) ($P = 0.018$). Women exhibited a higher recurrence rate (57%) than men (9.1%) ($P = 0.025$). The highest recurrence rate (45%) occurred in the 20–40 age group ($P = 0.047$). Prior surgery at the same site was associated with a 75% recurrence rate ($P = 0.021$). Patients from outside Tehran had significantly higher recurrence rates ($P = 0.001$). Logistic regression identified female sex as a significant predictor ($P = 0.046$), with a 13-fold increased risk.

Conclusion: Recurrence of HS after surgery is common, particularly in women, in non-axillary regions, and in patients with a history of prior surgery. Multidisciplinary management, including weight reduction and biologic therapies, is essential for optimizing outcomes in severe cases.

Keywords: hidradenitis suppurativa, risk factors, recurrence, surgical procedures, quality of life

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What is already known on the subject?

- Hidradenitis suppurativa (HS) is a chronic, recurrent inflammatory condition affecting intertriginous areas. Radical excision is the most effective surgical treatment.
- Previous studies indicate that HS recurrence varies depending on the treatment method, with wide excision associated with lower recurrence rates. However, recurrence remains a major concern, particularly in specific anatomical locations and among certain patient subgroups.

The study's main messages:

- This study uniquely identifies female sex as an independent risk factor for HS recurrence, demonstrating a 13-fold higher risk of recurrence compared to males.
- It establishes a statistically significant association between anatomical site, prior surgery, and recurrence, offering new insights into patient selection, surgical planning, and postoperative management strategies.

INTRODUCTION

Hidradenitis suppurativa (HS) is a chronic, recurrent inflammatory disease of the hair follicles that commonly affects the intertriginous areas of the body. The clinical spectrum of this condition ranges from solitary nodules and deep skin abscesses to interconnected sinus tracts and hypertrophic scars¹. The prevalence of HS varies between 1% and 4% across different populations. The disease typically manifests after puberty and peaks before the age of 40, affecting women three times more frequently than men².

Although the exact pathogenesis of HS remains unclear, several factors, including genetic predisposition and environmental influences such as smoking, obesity, endocrine dysfunction, and biological factors, are thought to contribute³. The diagnosis is primarily clinical, with microbiological cultures, imaging, and skin biopsies used to exclude differential diagnoses. Based on severity, HS is classified into mild, moderate, and severe forms⁴.

Treatment approaches include topical and systemic antibiotics, intralesional corticosteroid injections, topical retinoids, anti-androgens, TNF- α inhibitors, and immunosuppressive therapies. In advanced cases, radical surgical excision remains the only effective

option. Early surgical intervention is considered crucial for preventing complications, reducing recurrence rates, and improving quality of life^{1,5,6}.

Postoperative complications include wound healing problems, wound infections, postoperative pain, and surgical scarring, occurring in 47.3% of patients according to an Austrian study. A significant concern is the high recurrence rate, with 18.9% of patients experiencing recurrence within four years of follow-up in the same study⁷. A meta-analysis also reported substantial recurrence rates, with recurrence occurring in 13% of cases after wide excision and 27% after deroofting. Factors influencing recurrence included lesion location, extent of involvement, and comorbidities. Recurrence rates varied by reconstruction type, with 15% for primary closure, 8% for flap closure, and 6% for grafting⁸.

HS significantly impairs quality of life compared to other dermatological conditions. Symptoms such as pain, disfigurement, and malodor contribute to reduced self-esteem, increased social isolation, and higher levels of anxiety and depression relative to the general population⁹.

Given the relatively high prevalence of HS and the substantial burden it imposes—including social stigma, psychological challenges, and employment difficulties—patients with HS experience higher rates of depression, anxiety, social isolation, and even suicidal ideation compared to the general population. Moreover, recurrence rates after surgery vary widely across studies. Importantly, no studies have been conducted in Iran to investigate the recurrence rates of HS and the associated factors. This highlights the necessity of conducting research to evaluate recurrence rates following surgical treatment and the contributing factors in this patient population. Therefore, this study aimed to investigate the recurrence rates and factors influencing recurrence following surgical intervention in patients with HS.

METHODS

This retrospective longitudinal study was conducted to assess the recurrence rate of hidradenitis suppurativa (HS) following surgical intervention at Razi Hospital in Tehran, a tertiary referral center specializing in dermatology. The study population included patients diagnosed with HS who underwent surgical treatment in 2022 and 2023, with a minimum postoperative

follow-up period of three months.

Demographic and clinical data were retrieved from archived medical records. To ensure the accuracy and completeness of the information, patients were subsequently contacted by telephone. When essential details were missing from the medical records, supplementary data were obtained directly from the patients during these calls.

A structured checklist was used to collect relevant data, including demographic variables (age, sex, education level, occupation, and residence) and disease characteristics (anatomical site, number of lesions, severity of lesions, and type of surgical procedure performed). Additional information, such as smoking status, disease duration, prior use of biologic therapies, and history of previous surgical interventions, was also obtained through telephone interviews. Patients were specifically asked about postoperative recurrence of HS lesions.

For the purpose of this study, recurrence was defined as the reappearance of erythema, swelling, discharge, nodules, or pustules at the site of the surgical intervention. This definition was clearly communicated to patients to ensure accurate and consistent reporting of any recurrence.

Statistical analysis

The collected data were analyzed using IBM SPSS Statistics (version 28; Armonk, NY, USA). Data are presented as mean \pm standard deviation (SD) and frequency (%). Appropriate statistical tests, including the Mann-Whitney U test, independent t-test, logistic regression, and likelihood ratio test, were applied to evaluate the results. A *P*-value of less than 0.05 was considered statistically significant.

Ethical considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approval from the Ethics Committee of Tehran University of Medical Sciences (Ethics code: IR.TUMS.MEDICINE.REC.1399.055). Due to the retrospective nature of the study, the requirement for informed consent was waived. To protect patient confidentiality, all collected data were anonymized prior to analysis, ensuring the exclusion of any identifiable information. Access to the dataset was strictly limited to authorized research personnel

to maintain data security and privacy.

RESULTS

The study included a sample of 20 patients who underwent surgical treatment for HS at Razi Hospital in 2022 and 2023. All patients were contacted, and 18 responded.

The patients' ages ranged from 13 to 58 years, with a mean age of 31 ± 10.8 years. For ease of representation, age was categorized into three groups, as shown in Figure 1. The highest frequency of cases and recurrences was observed in the 20–40 age group, accounting for 45% of recurrences. No recurrences were observed in the other two age groups. The relationship between age group and recurrence was statistically significant ($P = 0.047$).

Men comprised 65% of the participants, while women accounted for 35%. Recurrence rates were significantly higher in women (57%) than in men (9.1%) ($P = 0.025$).

A significant relationship was found between patients' place of residence and recurrence rates. Recurrence occurred in 7.7% of patients living in Tehran, compared to 100% of those residing in other cities ($P = 0.001$).

No significant associations were found between recurrence rates and education level, smoking status, occupation, socioeconomic status, or body mass index (BMI).

The frequency distribution of HS patients based on disease characteristics is presented in Table 1. The axillary region was the most commonly affected

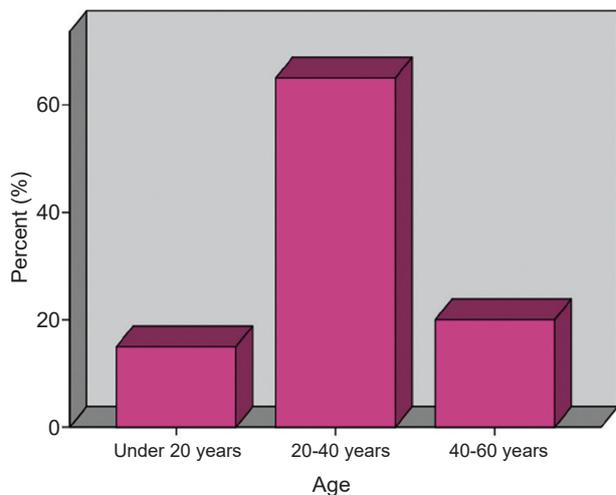


Figure 1. Age distribution of patients

Table 1. Frequency distribution of HS patients based on disease characteristics.

Variables	Groups	Frequency	Percent
Anatomical region	Axillary	15	75
	Breast	2	10
	Perineum	1	5
	Other	2	10
	Total	20	100
Hurley stage	Stage one	0	0
	Stage two	1	5
	Stage three	19	95
	Total	20	100
History of biologic use	Yes	8	40
	No	12	60
	Total	20	100
History of previous hidradenitis surgery	Same area	4	20
	Another area	8	40
	No record	8	40
	Total	20	100
Type of surgery	Flap	12	60
	Graft	4	20
	Flap+graft	4	20
	Total	20	100
Recurrence	Yes	5	27.7
	No	13	72.3
	Total	18	90

anatomical site (75%). Other involved areas included the breast, perineum, chin, and neck. Recurrence rates were 100% for lesions in the perineum and breast, 15% for axillary lesions, and 0% for lesions in the chin and neck. The relationship between anatomical site and recurrence was statistically significant ($P = 0.018$), as illustrated in Figure 2.

Ninety-five percent of patients were classified as Hurley stage three. No significant relationship was observed between Hurley stage and recurrence rates ($P = 0.412$).

The mean follow-up time after surgery was 14 ± 7.5 months, ranging from 3 to 24 months. No significant associations were observed between recurrence rates and either the duration of follow-up or the number of affected regions.

Regarding surgical techniques, 60% of patients underwent flap reconstruction, 20% received grafts, and 20% underwent a combination of both methods. Recurrence rates were 25% for flap procedures and 33% for grafts and combined methods. The relationship between surgical type and recurrence was not statistically significant ($P = 0.934$).

Twenty percent of patients had a prior history of HS

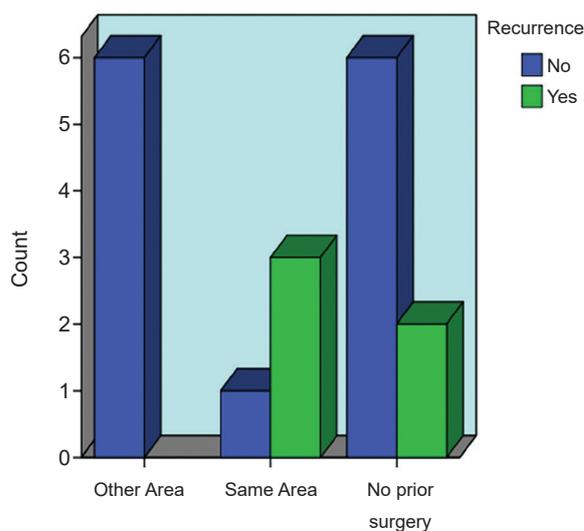


Figure 3. Recurrence rates after surgery based on prior surgical history.

surgery. Among these, 20% had undergone surgery in the same area. Recurrence rates were 25% in patients with no prior surgery, 75% in those with a history of surgery in the same area, and 0% in those with surgery in other areas. A statistically significant relationship was observed between surgical history and recurrence ($P = 0.021$). Overall, 27.7% of patients experienced recurrence after surgery. Recurrence rate after surgery based on prior surgical history is shown in Figure 3.

No significant associations were found between recurrence rates and a history of diabetes, metabolic syndrome, use of biologic drugs, or a family history of HS.

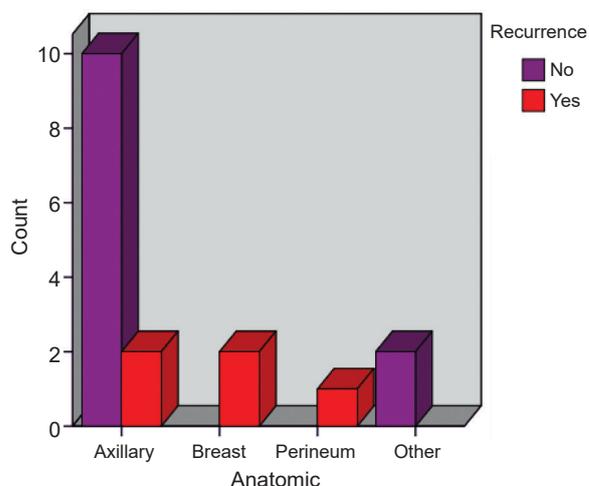


Figure 2. Frequency of recurrence after surgery based on anatomical site.

DISCUSSION

HS remains a challenging chronic condition for both patients and physicians. Its etiology is still under debate, as reflected by the lack of definitive treatment options. Despite various therapeutic approaches, no universally effective solution exists, and disease recurrence remains a significant concern.

In the present study, the demographic and clinical characteristics of HS patients, along with recurrence rates post-surgery, were analyzed. The findings are consistent with several previously published studies, while also providing unique insights into factors influencing outcomes in this population.

The average age of patients in our study was 31 years, similar to the findings of Mendes *et al.*, who reported a mean age of 32 years². In both studies, the axillary region was the most commonly affected anatomical site, followed by the gluteal and inguinal regions. These results underscore the predilection of HS for intertriginous areas.

In terms of sex distribution, 65% of our patients were men, which is comparable to the 54% male prevalence reported by Posch *et al.*⁷. However, recurrence rates in our study were significantly higher in women (57%) compared to men (9.1%), a finding consistent with a meta-analysis by Ovadja *et al.*, which also reported higher recurrence rates in women¹⁰. This disparity may be related to hormonal factors or differences in skin physiology, warranting further investigation.

In our study, wide resection was performed on all patients, resulting in a recurrence rate of 27.7% after a mean follow-up of 14 months. This finding aligns with the study by Kimball *et al.*, which reported a recurrence rate of 27% following wide resection, compared to higher rates after split resection or drainage procedures¹¹.

Interestingly, flap reconstruction in our study showed the lowest recurrence rate (25%) compared to grafts (33%) and combined methods (33%). These results are consistent with the study by Mendes *et al.*, which reported that flap reconstruction was associated with lower recurrence rates (22%) compared to other techniques². The advantages of flap reconstruction may include better coverage, reduced tension, and improved vascularity, all of which contribute to enhanced healing and decreased recurrence.

Recurrence rates varied significantly by anatomical

site. In our study, lesions in the perineal region exhibited a 100% recurrence rate, whereas axillary lesions showed only a 15% recurrence. These findings align with Ovadja's meta-analysis, which reported higher recurrence rates for lesions in the lower body¹⁰. The increased susceptibility of the perineal region may be attributed to continuous friction and maceration, emphasizing the need for tailored surgical and postoperative strategies for these areas.

Our study found no significant association between recurrence and smoking, BMI, or socioeconomic factors. However, 90% of patients in our study reported low to moderate socioeconomic status. Previous research, such as that by Vinding *et al.*, has highlighted the socioeconomic burden of HS, including higher unemployment rates and reduced educational attainment among affected individuals¹². In our study, 20% of patients had a university-level education, which is comparable to other studies reporting lower educational achievement among HS patients compared to the general population. These findings underscore the broader impact of HS on patients' social and professional lives.

While the overall recurrence rate in our study aligns with the findings of Van Rappard *et al.* (23% recurrence after 11 months), it is lower than the 47% recurrence rate reported by Mendes *et al.* after one year. This discrepancy may be attributed to differences in patient populations, surgical techniques, and follow-up durations^{2,13}.

Interestingly, patients with a history of previous surgery in the same anatomical region exhibited a significantly higher recurrence rate (75%) compared to those without prior surgeries (25%). This highlights the importance of thoroughly evaluating surgical history and optimizing surgical planning to minimize the risk of recurrence.

Considering the prevalence of HS among young individuals and its significant economic, educational, social, and psychological impacts, as well as the high cost of treatment, increased support for patients is essential. Providing comprehensive care and addressing these challenges could reduce disease-related complications and recurrence, ultimately improving patients' quality of life.

Despite advances in surgical techniques, recurrence remains a significant challenge, particularly in certain anatomical sites and among female patients.

Future studies should investigate the underlying mechanisms contributing to sex disparities and site-specific recurrence. Additionally, strategies to improve socioeconomic outcomes and quality of life for patients with HS should be prioritized, given the broader impact of this chronic condition.

CONCLUSION

The findings of this study highlight the multifactorial nature of HS and the significant influence of demographic, anatomical, and surgical factors on recurrence rates. Given the higher recurrence rates observed in women and in non-axillary regions, surgical interventions in these areas should be more extensive, accompanied by meticulous postoperative care and shorter follow-up intervals. For severe lesions, combining surgical treatment with biologic therapies may improve outcomes. Additionally, since higher recurrence rates are noted in overweight patients, weight reduction programs should be considered for all individuals with elevated BMI. Addressing obesity as a modifiable risk factor could play a crucial role in reducing recurrence. These insights can guide clinical decision-making and inform individualized treatment strategies, ultimately improving outcomes for patients with HS.

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Authors' contributions

AHE, **MKM**, and **AR** conceived and designed the study. **BS**, **AE**, and **MN** were responsible for data acquisition. Data analysis and interpretation were conducted by **AR**, **MKM**, and **AE**. **BS**, **MN**, and **AE** contributed to the initial draft preparation. **AHE**, **MKM**, and **AR** critically revised the manuscript and approved the final version. All authors reviewed the manuscript and consented to its submission.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author, **AE**, upon reasonable request.

Conflict of interest: None declared.

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