

# Lateral Thoracic Flap in Axillary Hidradenitis Suppurativa- A Prospective Interventional Study

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## ABSTRACT

**Introduction:** Hidradenitis Suppurativa (HS) is a chronic socially debilitating disorder of unknown aetiology. Surgical treatments include simple incision and drainage; excision followed by healing by secondary intention or split-skin grafting and the more recent method of excision followed by local flap reconstructions. In this study, the use of a lateral thoracic fasciocutaneous island flap based on vessels arising from the thoracodorsal or thoracic lateral vessels is described.

**Aim:** To describe the benefit and outcomes of lateral thoracic flap reconstruction technique in treatment of axillary HS.

**Materials and Methods:** This prospective interventional study was conducted at the Plastic Surgery Department at Amala Institute of Medical Sciences, Thrissur, Kerala, India (tertiary care center), from January 2017 to June 2018. The study included 36 patients with chronic axillary hidradenitis, who underwent lateral thoracic flap surgery on one or both axillae. These patients were studied closely preoperatively during surgery and during postoperative follow-up period. The basic demographic details, clinical parameters and Hurley stage; along with postoperative outcomes were recorded. Data was summarised using descriptive statistics.

**Results:** The study sample consisted of 36 patients with a mean age of 38.33±13.11 years. There were 20 females and 16 males. Total 11 patients were having co-morbidities in the form of type 2 diabetes mellitus or hypertension. The mean duration of illness was 3.17±1.44 years. Six patients had bilateral axilla involvement and underwent bilateral axillary reconstructions. Out of these 36 patients; 30 patients only had antibiotic treatment previously and five patients underwent excision of affected axillary skin previously without flaps; one patient was treatment naïve. Total 24 patients were Hurley stage 2 and 12 were stage 3. These patients were taken up for repair with a lateral thoracic flap. The mean postoperative hospitalisation was six days. There was no impairment of shoulder movement in the early or late postoperative period. There were no surgical complications in terms of vessel damage or flap viability. All flaps healed without complications and there was no recurrence of disease or scar contracture during the follow-up period.

**Conclusion:** Lateral thoracic flap reconstruction for axillary HS is without doubt the strategy for treating axillary HS due to its lower recurrence rates.

**Keywords:** Axilla, Benefits, Lateral thoracic flap, Reconstruction, Surgical outcomes

## INTRODUCTION

Hidradenitis Suppurativa (HS) is a disorder of the terminal follicular epithelium in the apocrine gland bearing skin [1]. It is characterised by comedo-like follicular occlusion, chronic relapsing inflammation, mucopurulent discharge and progressive scarring. This disorder is a long-lasting disabling ailment that persistently develops and often causes keloids, contractures and immobility. It is one of the four conditions that comprise the “follicular occlusion tetrad” due to similar pathophysiology [2]. It is also called acne inversa, due to fact that it is an expression of follicular occlusion in localisations inverse to acne vulgaris. However, HS differs from acne in that no increase in sebaceous secretions is seen in HS [3].

The prevalence of HS appears to be 1% of the general population [4]. HS is widely considered to occur more frequently in females than in males, with a ratio as high as 2-5:1 [5]. The onset of HS ranges from 11-50 years, with an average patient age of 23 years, rarely manifesting before puberty [5]. Recent epidemiological data also suggest an association of HS with other diseases and co-morbidities, including obesity and the metabolic syndrome [6-8]. It is also a well-documented manifestation of the clinical syndrome known as SAPHO (synovitis, osteitis, pustulosis, hidradenitis and osteitis) syndrome [9]. Cigarette smoking has been found to be a triggering factor for HS [10]. Three key elements are required to diagnose HS are presence of typical lesions, characteristic distribution (groin, axilla) and recurrence (two recurrences over a period of six months), according to the consensus approach [11,12]. The Hurley clinical staging of HS has been used as the recommended system for deciding relevant conservative or surgical treatment [13,14].

Medical treatment is suggested in initial stages, whereas surgery should be executed after the development of abscesses, fistulas, scars and sinus tracts [15]. Medications such as antibiotics, corticosteroids, retinoids, antiandrogens and immunosuppressants are used [16]. Non ablative radiofrequency therapy can also be used for patients with Hurley stage I and II disease [17]. Surgery is most valuable in the chronic, recurrent stages of HS. Wide surgical excision, with margins well beyond the clinical borders of activity, remains the most definitive surgical therapy [18].

Methods such as primary closure and reconstruction by Split Skin Grafting (SSG) are inadequate for complete disease management. Patients who undergo attempted primary closure experience ‘give way’ or infection of wounds, ultimately resulting in an open axillary defect that would require a closure or reconstruction by other methods. Grafts may provide wound cover but generally undergo contracture making limb movement very difficult. It does not help preserve the local skin contour, does not have the same thickness as the surrounding skin and may give way leaving defects in closure of excised skin in parts [19].

To counter these disadvantages, the placement of advancement and transposition flaps over the axillary defect is the technique employed. Available flap options include islanded flaps such as the Thoracodorsal Artery Perforator (TDAP) flap and V-Y advancement flap, which rely on underlying perforators for circulation [18]. The lateral thoracic transposition flap is similar, except that it offers a longer flap and more robust tip with the delay technique [20]. This is the technique that was employed for the patients of this study.

The aim of this study was to describe the benefit and outcomes of lateral thoracic flap reconstruction technique in treatment of axillary HS.

## MATERIALS AND METHODS

This prospective interventional study was conducted at the Plastic Surgery Department at Amala Institute of Medical Sciences, Thrissur, Kerala, India (tertiary care center), from January 2017 to June 2018. The study protocol and other relevant documents for this study were reviewed by the Institutional Ethic Committee (IEC) (ECR/653/Inst/KL/2014/RR-17).

**Inclusion criteria:** Patients with a known case of axillary HS with a Hurley stage >2, who had tried other treatments modalities without much success were included in the study.

**Exclusion criteria:** Patients <18 and >80 years of age, with co-morbid chronic kidney disease, chronic liver disease, coronary artery disease and chronic obstructive pulmonary disease were excluded from the study.

Data was collected at the Department preprocedure and then postprocedure when the patients came for their follow-up appointments. Demographic data such as age, sex, co-morbidities such as diabetes and hypertension were collected. Clinical parameters such as axillary involvement (unilateral/bilateral), previous treatment modalities taken prior to surgery and Hurley stage of the disease was also collected [13]. Finally, data on the postsurgical complications (loss of skin mobility, contractures, wound infection, wound necrosis, loss of contour, loss of skin thickness) were collected.

### Study Procedure

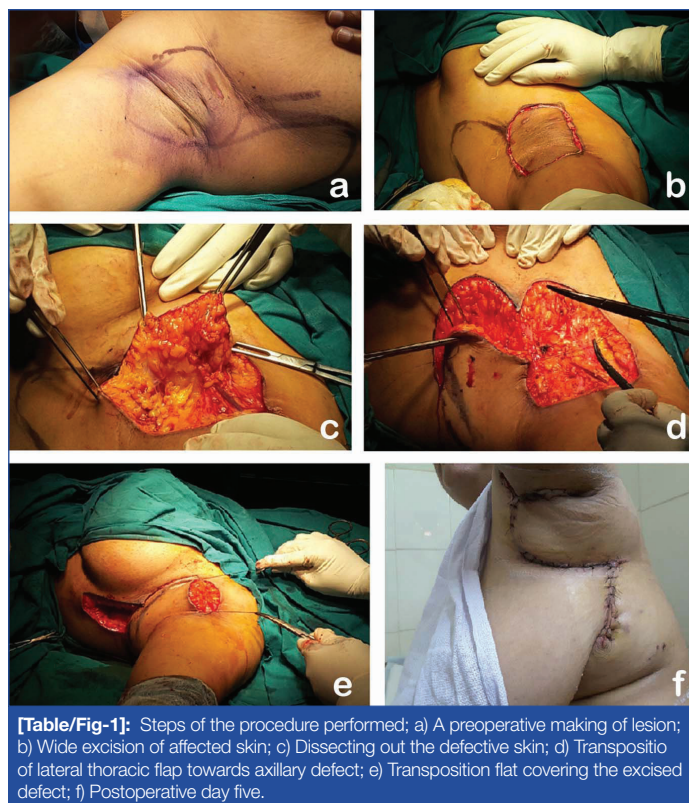
Before surgery, the vessels supplying the skin island were detected by a simple vascular doppler or by power doppler and marked with non soluble ink [21]. The rhomboid shaped affected skin (between: 35-120 cm<sup>2</sup>) was then radically excised, including all the apocrine sweat glands in the area and the complete hair-bearing area with a subcutaneous layer of fatty adipose tissue about 1-2 cm thick also including the fascia in case the hidradenitis inflammation and fibrosis reaches the fascial layer. A fasciocutaneous flap of the same size caudal to the defect between the anterior and posterior axillary lines was incised and harvested, taking care to include the marked vessels. It was raised as an island flap based on the ascending vessels and inset as an advancement or transposition flap into the defect in the axilla. The thickness of the flap depends on the depth of resected tissue. The axillary fascia and the subcutaneous tissue adjacent to the pectoralis major muscle can be used to increase vascularity via the lateral thoracic artery. If the flap is too bulky, the subcutaneous fat may easily be removed under direct vision, avoiding vascular damage. Advancement/transposition by rotation from 90-180° along the blood vessels axis depends on the local situation and the distribution of the nourishing flap vessels, and also the range of motion required. The donor site was closed by primary wound closure, which was achieved by undermining of edges. A suction drain was placed at the wound site before closure to avoid seroma/haematoma formation. Wound was inspected for the first time after 48 hours of procedure and regular cleaning and dressing was done. Sutures were removed 14 days post procedure unless otherwise indicated as in case of wound infection or collection where they may need to be removed earlier. The steps of the procedure were shown in [Table/Fig-1].

### STATISTICAL ANALYSIS

All results were compiled on Microsoft excel version 2019. Continuous variables (age, body mass index and average duration of illness) were expressed as mean with standard deviation. Categorical variables including co-morbidities and postsurgical complications were measured in terms of frequency of study participants and percentages.

### RESULTS

A total of 36 patients were included in the study. The mean age was 38.33±13.11 years. The average body mass index of the was



**[Table/Fig-1]:** Steps of the procedure performed; a) A preoperative making of lesion; b) Wide excision of affected skin; c) Dissecting out the defective skin; d) Transposition of lateral thoracic flap towards axillary defect; e) Transposition flap covering the excised defect; f) Postoperative day five.

25.5±2.5 kg/m<sup>2</sup>. The patient suffered from the illness for an average of 3.14±1.4 years.

Out of 36 patients who underwent flap reconstruction, 30 underwent unilateral axillary reconstruction and six underwent bilateral axillary reconstruction. Out of the 36 patients studied, 35 of them had undergone some form of treatment before a flap reconstruction was considered. Total 35 patients had already been given a course of antibiotics for 7-10 days to control infection or on a trial basis. Out of these 30 patients only had antibiotic treatment previously. Five patients underwent excision of affected axillary skin previously out of which; two patients had primary closure attempted postexcision (which got infected subsequently and gave way) and three patients had split skin graft attempted postexcision (which did not take in any of the three cases) [Table/Fig-2]. The average hospital postoperative recovery period was 6.58±1.31 days.

Parameters	n (%)
<b>Age (years)</b>	
≤20	1 (2.8%)
21-30	11 (30.6%)
31-40	10 (27.8%)
41-50	7 (19.4%)
51-60	6 (16.7%)
≥61	1 (2.8%)
<b>Sex</b>	
Male	16 (44.4%)
Female	20 (55.6%)
<b>Co-morbidities</b>	
Diabetes mellitus	7 (19.4%)
Hypertension	3 (8.3%)
Hypertension and diabetes	1 (2.8%)
Nil	25 (69.4%)
<b>Axillary involvement</b>	
Unilateral	30 (83.3%)
Bilateral	6 (16.7%)

Previous treatment taken	
Nil	1 (2.8%)
Antibiotic treatment alone	30 (83.3%)
Primary closure	2 (5.6%)
Split skin grafting	3 (8.3%)
Stage of the disease	
Hurley Stage 2	24 (66.7%)
Hurley Stage 3	12 (33.3%)

[Table/Fig-2]: Demographic, clinical and staging characteristics distribution.

Out of the 36 patients who underwent the flap reconstruction, only one person had wound infection unilaterally. She was a known case of type 2 diabetes mellitus on insulin. Two patients who underwent unilateral procedure had skin necrosis, which was subjected to debridement and secondary suturing. The patients eventually had a good recovery post secondary suturing [Table/Fig-3]. There were not a single case of loss of mobility, contractures, loss of skin contour and thickness. There was no recurrence of disease or scar contracture during the follow-up period.

Complications	n (%)
Wound infection	1 (2.8%)
Wound necrosis	2 (5.6%)
No complications	33 (91.6%)

[Table/Fig-3]: Postoperative events and complications.

## DISCUSSION

Surgery is indicated for chronic HS that is not relieved by medical management. In chronic HS, the affected tissue should be removed

with wide borders with special efforts made to remove all deeply burrowed glands. To avoid contractures and shoulder stiffening from secondary healing, primary healing using direct closure, split-skin grafting, or local flap application is suggested [15]. The lateral thoracic flap is designed to be employed as a single staged procedure of flap placement after wide excision of axillary skin. It derives its blood supply from these perforators and it thereby is very robust and can reach dimensions reaching 30x15 cm [21]. The [Table/Fig-4] summarises the review of literature in support of lateral thoracic flaps in HS [19,20,22-27].

As can be seen from the literature, these studies showed the results from a case series and none of the studies show evidence regarding the role of the lateral thoracic flap in an Indian cohort.

The mean postoperative hospitalisation was six days and early physiotherapy starting on the first postoperative day. Most flaps healed without complications, except for one case of wound infection and two cases of flap necrosis; which were treated and subsequently the patients did well. There was no recurrence of disease or scar contracture during the follow-up period.

This study is the largest prospective interventional study from South India regarding the feasibility of lateral thoracic flaps in the management of HS and shows excellent efficacy and results comparable with the other studies mentioned in the literature review. In intractable axillary HS, the accessibility of suitable flap coverage permits for wide resection of all of the hair-bearing skin, leading to a low incidence of residual disease and subsequent recurrence. This also provides an important perspective for physicians seeking an effective, permanent treatment for HS rather than long-term medical therapy, which itself is associated with significant morbidity.

Author and year of publication	Place of study	Sample size	Flap procedure done	Key outcome measures	Key findings
Schwabegger AH et al., [20] (2000)	Austria	8	Lateral thoracic fasciocutaneous island flap	Surgical complications, scar contracture, postoperative hospitalisation, shoulder mobility, recurrence	No surgical complications, no scar contracture, no impairment of shoulder mobility, mean postoperative hospitalisation=fourth days, no recurrence.
Rehman N et al., [22] (2005)	United Kingdom	3	Thoracodorsal Artery Perforator (TDAP) type I V-Y advancement flap	Surgical complications, mobility, recurrence	No surgical complications, no impairment of shoulder mobility, recurrence of disease in one patient which required re-excision.
Schwabegger AH et al., [19] (2002)	Austria	12	TDAP flap- 2 times as island flap, 10 times as free flap	Success of the flap	Island flap failed on both occasions, free flap failed once. Use of TDAP is indicated in cases where a long vascular pedicle for an appropriate free tissue transfer is necessary, and where aesthetic appearance and minimising donor-site morbidity are more important than a potentially high-risk for failure.
Teo WL et al., [23] (2012)	Singapore	2	Lateral thoracic fasciocutaneous flap (long)	Recurrence, complications, patient satisfaction	Long lateral flap with delay has excellent coverage with minimal donor tissue sacrifice, high level of patient satisfaction, no complications, no recurrence.
Wormald JC et al., [24] (2014)	United Kingdom	27	TDAP -n=15 Split Skin Graft (SSG)-n=12	Recovery, complications, Quality Of Life (QOL), overall number of procedures	Fewer complications, fewer overall number of procedures, fewer complications and improved QOL in TDAP flap when compared with SSG.
Ortiz CL et al., [25] (2010)	Spain	16	TDAP flap	Dimensions of flap, functional and aesthetic outcomes	Despite final scar, functional and aesthetic outcomes were satisfactory. Largest dimension of TDAP flap used was 15x9x8 cm. TDAP is a useful option for surgical treatment of axillary HS.
Rodriguez JM et al., [26] (2019)	Colombia	2	TDAP, Lateral Thoracic Artery Perforator (LTAP)	Residual disease, aesthetic result, range of motion of shoulder	No residual disease, satisfactory aesthetic result, normal range of motion of shoulder. Wide resection and reconstruction with pedicled perforator flaps is validated as alternative to SSG.
Dietrich et al., [27] (2021)	Germany	10	TDAP, LTAP flap	Clavien-Dindo classification, aesthetic results, range of motion, recurrence	No complications (no wound necrosis), one in 10 patients complained of a visible scar, ROM unlimited in all cases with maximum abduction angle of 178.8±4.2°. Recurrence was not observed during post-surgical follow-up of 27.2±14.4 months.
Present study Malar KK et al., (2022)	India	36	Lateral thoracic flap reconstruction technique	Recurrences, contractures with this single stage procedure for axillary HS	Two patients who underwent unilateral surgery had wound necrosis, while one patient had wound infection. There were no complications with respect to loss of skin mobility, contour or thickness. There were also no cases with skin contractures reported. Mean postoperative hospitalisation was six days and no recurrence of disease was reported.

[Table/Fig-4]: Review of literature in support of thoracic flaps in axillary Hidradenitis Suppurativa [19,20,22-27].

## Limitation(s)

The present study was limited due to lack a control arm in the study. Also, there was a lack of long term follow-up to study complications. Authors did involve a large number of patients, the study was performed at a single institution and with the same team of surgeons, which gives rise to inherent biases. A multi-institutional study is warranted in the future to ensure interobserver reliability.

## CONCLUSION(S)

The studied method has numerous advantages like having less recurrence, no contractures, preserved axillary contour, being a single stage procedure, having similar and high-quality skin texture and similar skin thickness as seen over the entire study period. Practice and awareness of the lateral thoracic flap technique for HS should become more widespread, especially in an Indian setting, to provide patients with better outcomes.

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### PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Apr 25, 2022
- Manual Googling: Jul 19, 2022
- iThenticate Software: Aug 29, 2022 (13%)

### ETYMOLOGY: Author Origin

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Apr 23, 2022**  
Date of Peer Review: **May 22, 2022**  
Date of Acceptance: **Jul 21, 2022**  
Date of Publishing: **Sep 01, 2022**