Original Article
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Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2026 (5 Oct);40.107. https://doi.org/10.47176/mjiri.40.107

Bilateral Thoracoscopic Sympathicotomy in the Treatment of Hyperhidrosis: A Study on Long-term Outcomes and Impacts on Patients' Daily Lives

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Received: 20 May 2025 Revised: 14 Sep 2026 Accepted: 24 Sep 2026 Published: 5 Oct 2026

Abstract

Background: Primary palmar hyperhidrosis is a condition characterized by excessive sweating of the palms, which can significantly impair quality of life and social functioning. Conservative treatments such as antiperspirants, anticholinergics, and botulinum toxin are often insufficient for patients with severe disease.

Methods: A retrospective analysis was conducted on 93 patients with severe primary palmar hyperhidrosis who underwent this surgical technique over a nine-year period. Outcome measures included recurrent hyperhidrosis and postoperative satisfaction. Patient satisfaction was assessed using the Visual Analogue Scale (VAS) at least one year post-surgery. Data were analyzed using SPSS software (version 26). The Mann–Whitney U test was used to compare postoperative satisfaction scores between independent groups. A significance level of 5% ($p < 0.05$) was considered statistically significant.

Results: The mean age of the patients was 27.05 ± 8.78 years. The cohort consisted of 51 (54.8%) females and 42 (45.2%) males. 71% of patients had received at least one treatment before surgery. The mean satisfaction score following surgery was 8.82 ± 1.92 on the 10-point VAS scale, with with 49 (52.7%) patients reporting a maximum satisfaction score of 10 out of 10 satisfaction score of 10. 35 (37.6%) patients experienced symptom recurrence after surgery.

Conclusion: Bilateral thoracoscopic sympathicotomy was associated with high postoperative patient satisfaction in patients with primary palmar hyperhidrosis. Lower BMI was associated with higher postoperative satisfaction. Further prospective comparative studies are needed to confirm these findings.

Keywords: Bilateral Thoracoscopic, Sympathicotomy, Hyperhidrosis, Primary Palmar Hyperhidrosis, Patient Satisfaction

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Cite this article as: Hemmati H, Ahani H, Farzin M, Eslami Kenarsari H. Bilateral Thoracoscopic Sympathicotomy in the Treatment of Hyperhidrosis: A Study on Long-term Outcomes and Impacts on Patients' Daily Lives. *Med J Islam Repub Iran.* 2026 (5 Oct);40:107. https://doi.org/10.47176/mjiri.40.107

Introduction

Primary hyperhidrosis is a disorder marked by sweating beyond physiological needs, caused by hyperactive sweat glands. It affects about 1–3% of people worldwide, who often sweat excessively in localized regions such as the palms, axillae, feet, and face. Conservative options—including antiperspirants, anticholinergics, and botulinum toxin—are frequently used, but many patients with severe disease do not achieve adequate control (1-3).

Severe primary palmar hyperhidrosis (PPH) has a profound effect on quality of life and may cause psychological

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Key Messages:

↑What is "already known" in this topic:

Bilateral thoracoscopic sympathicotomy is an established surgical treatment for primary palmar hyperhidrosis in patients who do not respond to conservative therapies. Previous studies have demonstrated high success rates, although symptom recurrence and long-term patient satisfaction remain important considerations.

→What this article adds:

This study reports the long-term outcomes of bilateral thoracoscopic sympathicotomy in 93 patients with primary palmar hyperhidrosis. Most patients reported high postoperative satisfaction, while symptom recurrence occurred in a minority of cases. Lower body mass index was associated with higher postoperative satisfaction, providing additional information for patient counseling and postoperative expectations.

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[DOI: 10.47176/mjiri.40.107]

and social difficulties (4). For patients who do not improve with conservative care, thoracoscopic sympathicotomy is considered the most effective surgical treatment (5). Despite its Although this procedure effectively reduces primary sweating, compensatory hyperhidrosis (CH)—increased sweating in areas such as the back or chest—remains a principal postoperative concern. CH is frequently cited as the most common adverse effect of thoracoscopic sympathicotomy and can lower patient satisfaction, thereby limiting the procedure's overall success (6, 7).

Reported rates of CH after endoscopic thoracic sympathectomy (ETS) vary widely, from 3% to 90% (3, 8). Several studies have examined possible risk factors, such as the level and completeness of sympathectomy, patient age, and body mass index (BMI) (9, 10). Nevertheless, the mechanisms underlying CH are still not fully clear, and preventing or managing this complication remains difficult.

While CH is a well-known consequence of thoracoscopic sympathicotomy, long-term studies that track its evolution and impact on patient satisfaction are still limited. Recent evidence suggests that the level of sympathicotomy and baseline characteristics such as age and BMI may influence CH occurrence and severity (6). Addressing these gaps is important for improving patient counseling and surgical decision-making.

Therefore, this study evaluated postoperative recurrence and patient satisfaction after bilateral thoracoscopic sympathicotomy in patients with primary palmar hyperhidrosis.

Methods

Study Population

A retrospective analysis was conducted on patients who underwent bilateral thoracoscopic sympathicotomy for primary palmar hyperhidrosis at our institution between 2013 and 2022.

Inclusion criteria were patients diagnosed with primary palmar hyperhidrosis who underwent bilateral thoracoscopic sympathicotomy during the study period and had complete medical records and postoperative follow-up data.

Exclusion criteria included patients with secondary hyperhidrosis, previous thoracic sympathetic surgery, incomplete medical records, or missing postoperative follow-up data.

During the study period, 93 patients met the eligibility criteria. All eligible patients had complete medical records and postoperative follow-up data and were included in the final analysis. No patients were excluded, and no patients were lost to follow-up.

As this was a retrospective study, all eligible patients who met the inclusion criteria during the study period were included. Therefore, no formal sample size calculation was performed.

Surgical Procedure

All patients underwent bilateral uni-portal video-assisted thoracoscopic sympathicotomy (VATS) with single-lung ventilation and dual-lumen intubation. The surgical procedure followed the steps outlined below: Patient Positioning: The patient was placed in a supine position with the upper body tilted at a 45° angle, and the arms were extended at a 90° angle to stabilize the body. Incision and Insertion: A 1 cm incision was made at the second intercostal space along the anterior axillary line. A 3 mm trocar and thoracoscope were inserted, and CO2 was used to induce pneumothorax at a pressure of 8 mmHg. Sympathicotomy: Once the thoracic cavity was explored, the sympathetic nerve chain was identified. An electrocoagulation hook was used to sever the sympathetic nerve trunk. To ensure complete resection, cauterization was extended approximately 2 cm horizontally along the rib surface adjacent to the sympathetic nerve branches. Monitoring and Verification: During the procedure, vital parameters, including heart rate, blood pressure, oxygen saturation, and changes in palm temperature and sweating, were continuously monitored. Successful treatment was indicated by a 1-2°C increase in palm temperature and the transition from wet to dry palms. Postoperative Care: After ensuring no air leakage or bleeding, a drainage tube was placed in the chest cavity to remove any residual gas. The lung was then reinflated, and once no residual gas was detected (no bubbling), the drainage tube was removed, and the incision was sutured.

Outcome Measures

The primary outcome measures were postoperative recurrence of hyperhidrosis and patient satisfaction. Patient satisfaction was assessed using a 10-point Visual Analogue Scale (VAS), where 0 indicated no satisfaction, and 10 indicated complete satisfaction. The assessment was performed at least one year after surgery during postoperative follow-up.

Data Analysis

Data collected from the patient records were coded and entered into SPSS software (version 26) for analysis. Descriptive statistics for quantitative variables were presented as mean ± standard deviation, while qualitative variables were described using frequencies and percentages.

To compare postoperative satisfaction scores between independent groups (based on sex, age, and BMI categories), the Mann–Whitney U test was used, the Mann–Whitney U test was used. Because of the retrospective design, limited sample size, and exploratory nature of the study, no multivariable regression analysis was performed. A significance level of 5% ($p < 0.05$) was considered statistically significant.

Results

This study analyzed data from 93 patients with primary palmar hyperhidrosis who underwent bilateral thoracoscopic sympathicotomy between 2013 and 2022. The cohort consisted of 51 (54.8%) females and 42 (45.2%) males, with a mean age of 27.05 ± 8.78 years. The youngest patient was 14 years old, and the oldest was 58 years old. The mean BMI of the patients was 23.30 ± 3.29, with a minimum of 16.04 and a maximum of 30.11 (Table 1). Regarding the family history of hyperhidrosis, 61 patients (65.6%) had no family history, while 32 patients (34.4%) reported a family history of hyperhidrosis. Before surgery, 27 patients (29%) had not received any treatment for hyperhidrosis, while 66

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Table 1. Baseline characteristics of the study participants (N = 93)

Variable	Mean ± SD
(Continuous variables)	
Age (years)	27.05 ± 8.78
BMI (kg/m²)	23.30 ± 3.29
Categorical variables	
Variable	n (%)
Sex	
Female	51 (54.8)
Male	42 (45.2)
Family history of hyperhidrosis	
Yes	32 (34.4)
No	61 (65.6)
Previous treatment	
Yes	66 (71.0)
No	27 (29.0)
Recurrence	
Yes	35 (37.6)
No	58 (62.4)

patients (71%) had undergone at least one form of treatment.

Of the 93 patients, 58 (62.4%) did not experience any recurrence of symptoms after the surgery, while 35 (37.6%) patients had a recurrence following the bilateral thoracoscopic sympathicotomy. The overall mean postoperative satisfaction score was 8.82 ± 1.92, with a median score of 10. The satisfaction score ranged from 1 to 10. A total of 49 patients (52.7%) reported a maximum satisfaction score of 10, indicating complete satisfaction with the surgery. Among the patients, 6.5% reported minimal improvement, 8.6% reported partial improvement, and 84.9% reported complete improvement.

The satisfaction scores were categorized as follows: patients with scores of 0–1 were classified as showing no improvement, scores of 2–4 indicated minimal improvement, scores of 5–7 represented partial improvement, and scores of 8–10 indicated complete improvement. The average postoperative satisfaction score for patients under 27 years of age was 8.93 ± 1.72, while for those aged 27 years and older, the score was 8.68 ± 1.95. Statistical analysis showed no significant difference in satisfaction between the two age groups ($P = 0.508$) (Table 2).

The mean satisfaction score for female patients was 8.88 ± 1.87, while for male patients, it was 8.74 ± 1.97. There was no statistically significant difference in satisfaction between male and female patients ($P = 0.740$) (Table 3).

When assessing satisfaction based on BMI, patients with a BMI less than 23.53 had an average satisfaction score of 9.48 ± 0.81, while patients with a BMI of 23.53 or higher had a mean score of 8.17 ± 1.78. This difference was statistically significant ($P = 0.003$), indicating that patients with a lower BMI experienced higher levels of satisfaction postoperatively (Table 4).

Discussion

Bilateral thoracoscopic sympathicotomy is an effective treatment for primary hyperhidrosis, especially in severe palmar cases (7, 10). This minimally invasive approach offers meaningful symptom relief for patients who have not responded to topical antiperspirants, botulinum toxin injections, or oral drugs. However, CH continues to be a major postoperative issue that can affect long-term satisfaction (9, 11). In our cohort, 37.6% had recurrence and 62.4% remained symptom-free, suggesting generally favorable long-term results.

A high level of postoperative satisfaction was observed, with 84.9% of patients reporting complete improvement. This is consistent with previous studies showing that thoracoscopic sympathicotomy provides substantial symptom relief and high satisfaction in primary palmar hyperhidrosis (6, 10). Lower BMI was significantly associated with higher postoperative satisfaction, while age and sex showed no significant relationship (7).

CH is one of the most important postoperative concerns after thoracoscopic sympathicotomy. Earlier work suggests that the number of sympathetic levels interrupted affects CH incidence. Multi-level procedures (e.g., R2–R4) tend to produce more CH, while restricted or single-level sympathicotomy may lower CH rates while preserving efficacy (10).

Table 2. Postoperative Satisfaction by Age Group

Age Group	Postoperative Satisfaction (Mean ± S.D)	Frequency (%)	*P*-value
Under 27	8.93 ± 1.72	46 (49.5%)	0.508
27 and above	8.68 ± 1.95	47 (50.5%)	
Total	8.82 ± 1.92	۹۳ (100%)	

Table 3. Postoperative Satisfaction by Gender

Gender	Postoperative Satisfaction (Mean ± S.D)	Frequency (%)	*P*-value
Female	8.88 ± 1.87	51 (54.8%)	0.740
Male	8.74 ± 1.97	42 (45.2%)	
Total	8.82 ± 1.92	93 (100%)	

Table 4. Postoperative Satisfaction by BMI

BMI	Postoperative Satisfaction (Mean ± S.D)	Frequency (%)	*P*-value
Below 23.53	9.48 ± 0.81	46 (49.5%)	0.003
Above 23.53	8.17 ± 1.78	47 (50.5%)	
Total	8.82 ± 1.92	93 (100%)	

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Our findings also highlight the value of comprehensive preoperative counseling. Discussing expected outcomes, the possibility of recurrence, and realistic postoperative expectations may support informed decision-making and improve satisfaction (9, 10).

Finally, long-term follow-up is essential to monitor outcomes and recurrence. Continued surveillance allows timely interventions and refinements in surgical technique, ensuring the best possible results for patients undergoing thoracoscopic sympathicotomy (8, 11).

Limitations

Although this study provides valuable long-term clinical experience with bilateral thoracoscopic sympathicotomy, its findings should be interpreted with consideration of the retrospective design and single-center setting. In addition, the absence of a comparison group limits direct comparison with other treatment approaches. Future prospective studies are recommended to further validate these findings.

Conclusion

Bilateral thoracoscopic sympathicotomy was associated with high postoperative patient satisfaction in patients with primary palmar hyperhidrosis. In this study, lower BMI was associated with higher postoperative satisfaction, while no significant associations were observed with age or sex. Further prospective studies with comparative designs are recommended to confirm these findings.

Acknowledgment

The authors would like to thank the Guilan University of Medical Sciences, Razi Clinical Research Development Unit, and all healthcare staff who contributed to this study.

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

H. Hemmati conceptualized and supervised the study, performed the surgical procedures, and critically revised the manuscript. H.Ahani contributed to data collection, statistical analysis, interpretation of the findings, and manuscript drafting. M. Farzin contributed to the study methodology, interpretation of the results, and manuscript revision. H. Eslami Kenarsari participated in data collection, literature review, and manuscript editing. All authors read and approved the final version of the manuscript.

Ethical Considerations

The study was approved by the Ethics Committee of Guilan University of Medical Sciences (Approval No. IR.GUMS.REC.1402.386). All procedures involving human participants were performed in accordance with the ethical standards of the institutional research committee and the Declaration of Helsinki. Patient confidentiality was maintained throughout the study. Written informed consent was obtained from all participants prior to their inclusion in the study.

Funding Support

This research received no external funding.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

AI Use Statement

Generative AI was used solely to improve the language and readability of the manuscript. The authors reviewed, verified, and take full responsibility for the final content of the manuscript.

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[DOI: 10.47176/mjiri.40.107]