Original Article

Achieving high patient satisfaction after sympathectomy through preoperative thoracoscopic sympathetic nerve block in primary hyperhidrosis

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Background: Compensatory hyperhidrosis (CH) is a frequent complication following sympathectomy, influencing patient satisfaction. This study was established to evaluate the impact of bilateral thoracoscopic sympathetic nerve block (TSNB) on patient satisfaction after sympathectomy in the treatment of primary hyperhidrosis.

Methods: From March 2021 to August 2023, 52 patients with primary palmar and craniofacial hyperhidrosis underwent TSNB at T3 using a 2-mm thoracoscope under local anesthesia. One week later, they decided whether to proceed with sympathectomy. Satisfaction was assessed using a 100-point scale, and patients were divided into two groups based on CH occurrence after sympathectomy. The groups were compared in terms of sex, age, hyperhidrosis site, and satisfaction scores.

Results: Among 52 patients who underwent TSNB, 35 (67.31%) proceeded to sympathectomy, and CH occurred in 18 (51.43%) of these patients, while the remaining 17 patients (48.57%) did not develop CH. No significant differences were observed between the CH and no-CH groups regarding age (26.61±9.02 *vs.* 25.41±10.09 years, P=0.66), sex (61.11% *vs.* 52.94% male, P=0.88), or primary hyperhidrosis site (palmar: 77.78% *vs.* 88.24%, P=0.66). Satisfaction scores were comparable between the CH group (92.50±7.33) and the no-CH group (96.18±4.52), with no statistically significant difference (P=0.15).

Conclusions: Sympathectomy is associated with a high incidence of CH. Through TSNB, patients could preoperatively experience potential effects, including CH, enabling informed surgical decisions. Patients who developed CH reported high satisfaction levels comparable to those without CH, underscoring the utility of TSNB in improving patient-centered outcomes.

Keywords: Hyperhidrosis; sympathectomy; compensatory hyperhidrosis (CH); sympathetic nerve block; patient satisfaction

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Introduction

Thoracoscopic sympathectomy is widely recognized as an effective treatment for severe primary hyperhidrosis due to its superior outcomes compared with alternative therapies (1,2). However, a significant drawback is the potential for postoperative compensatory hyperhidrosis (CH), which occurs in 55–97% of cases (3,4). CH has been consistently identified as a primary factor driving patient dissatisfaction after sympathectomy (4-6). Efforts to mitigate CH have included limited level sympathectomy and lower-level sympathectomy (e.g., T4 instead of T3), which have shown promise in reducing the occurrence of CH but lack consensus on the most effective approach (6-9).

In 2008, Miller introduced temporary bilateral thoracoscopic sympathetic nerve block (TSNB) as a predictive tool to evaluate the likelihood of postoperative CH (10). Since 2009, we have employed TSNB under local anesthesia to provide patients with a temporary simulation of sympathectomy outcomes, including potential CH. Previous studies have demonstrated TSNB's utility as a safe, effective, and accurate method for predicting CH and improving patient decision-making before undergoing permanent sympathectomy (11-14).

To enhance overall treatment satisfaction in hyperhidrosis patients, bilateral TSNB prior to permanent sympathectomy can be performed. The aim of this study is to review our recent experience with TSNB as a predictive procedure and evaluate patient satisfaction. We present this article in accordance with the STROBE reporting checklist (available at https://jtd.amegroups.com/article/view/10.21037/jtd-2024-2145/rc).

Highlight box

Key findings

- Bilateral thoracoscopic sympathetic nerve block (TSNB) enables informed surgical decisions and maintains high patient satisfaction despite a high rate of compensatory hyperhidrosis (CH).

What is known and what is new?

- Sympathectomy is an effective treatment for primary hyperhidrosis but is associated with high CH rates, which impact patient satisfaction.
- This study demonstrates that TSNB is a safe and effective predictive tool, enabling patients to make informed surgical decisions and maintain high satisfaction despite CH.

What is the implication, and what should change now?

- TSNB is a valuable predictive measure for CH, enabling patient-centered decision-making.
- Future research should focus on validating its long-term effectiveness with larger and more diverse patient populations.

Methods

We conducted a retrospective review of medical records for 52 patients who underwent bilateral TSNB for primary palmar and craniofacial hyperhidrosis at a single institution (Incheon St. Mary's Hospital), performed by the same surgeon between March 2021 and August 2023. Patients with a history of recurrent hyperhidrosis after previous treatments, those already diagnosed with CH, or those requiring multilevel sympathetic nerve blocks were excluded from the study (*Figure 1*).

In general, the typical sympathetic block was performed as described in our previous studies (13,14). For the TSNB procedure, patients were positioned prone with their arms abducted at 90°, and probes were attached to both palms to monitor changes in temperature. After infiltration of 0.5% lidocaine at the fifth intercostal space along the mid-axillary line, a 2-mm thoracoscope was inserted through a surgical trocar following CO_2 insufflation. Under direct visualization, a spinal needle was used to deliver a 10-mL solution containing 37.5 mg of ropivacaine, 5 mg of dexamethasone, and 0.05 mL of 0.1% epinephrine bilaterally to the sympathetic chain (T3). An increase in palmar temperature confirmed the effectiveness of the procedure, and the trocar was removed during a Valsalva maneuver. All patients were discharged on the day of the procedure. One week after the TSNB, patients were interviewed regarding its effects and any complications, specifically CH. Based on this, they decided whether to proceed with sympathectomy.

Patients who decided to proceed with sympathectomy underwent the procedure under general anesthesia. A 2-mm thoracoscope was introduced into the pleural space via a surgical trocar after CO_2 insufflation. Using 2-mm endoscissors, the target sympathetic chain (T3) was excised under thoracoscopic guidance. After removing air from the pleural space, the trocar was extracted, and the patients were extubated and transferred to recovery. For patients who underwent sympathectomy, a follow-up interview was conducted 1 week later. CH was categorized as absent, mild, moderate, or severe, with moderate and severe cases classified as CH for analysis. Patient satisfaction was rated on a 100-point scale.

We conducted this study in compliance with the principles of the Declaration of Helsinki (as revised in

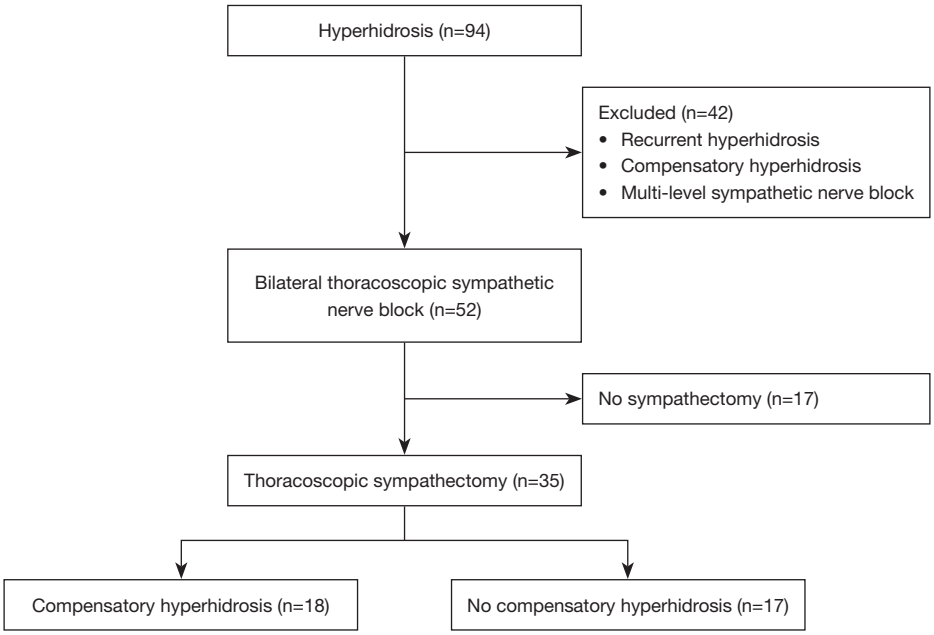

Figure 1 Flowchart showing the selection of the study population.

2013). The study's protocol was reviewed and approved by the Institutional Review Board of Incheon St. Mary's Hospital, College of Medicine, the Catholic University of Korea (IRB approval No. OC24RISI0085). Given its retrospective nature, the requirement for informed consent was waived.

Statistical analysis

We retrospectively analyzed data of patients who underwent TSNB for primary hyperhidrosis. Categorical variables are presented as counts and percentages, while continuous variables are expressed as means with standard deviations. Group comparisons were performed using the Mann-Whitney *U* test for continuous variables and Fisher's exact test or Chi-squared test for categorical variables. Statistical significance was defined as $P<0.05$. All statistical analyses were conducted using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 52 patients who underwent the predictive procedure were included in this study. Perioperative characteristics of the 52 patients who underwent TSNB are shown in Table S1, which includes data for all patients in the study population. The two cases of pneumothorax (3.85%) observed in our study were all minor and resolved spontaneously without intervention. Outpatient follow-up confirmed complete resolution, and no patients required extended hospitalization or readmission due to pneumothorax. Thirty-five (67.31%) patients ultimately underwent sympathectomy. Perioperative characteristics of the 35 patients who proceeded to sympathectomy following TSNB are presented separately in *Table 1*. The mean age for the sympathectomy population was 26.03±9.44 years with a male predominance (20 patients, 57.1%). Sympathectomy was performed in patients with primary craniofacial or palmar hyperhidrosis, while axillary and plantar hyperhidrosis were secondary coexisting conditions rather than primary indications for surgery. Most of the study population exhibited palmar hyperhidrosis (29 patients, 82.9%). Twenty-seven (77.1%) patients had symptoms on their feet. Eight (22.9%) patients had axillar hyperhidrosis, and 7 (20.0%) patients had craniofacial hyperhidrosis. These symptoms were not mutually exclusive, as some patients experienced overlapping symptoms.

Table 2 presents the perioperative outcomes of patients who underwent sympathectomy, categorized into two groups: those who developed CH (CH group) and those who did not (no-CH group). CH occurred in 18 patients (51.43%). The no-CH group consisted of 17 patients (48.57%). There was no statistically significant difference in baseline characteristics between the two groups. The age,

Table 1 Perioperative characteristics of patients who underwent sympathectomy following bilateral thoracoscopic sympathetic nerve block

Characteristics	Sympathectomy group (n=35)
Age (years)	26.03±9.44
Male	20 (57.1)
Hyperhidrosis site	
Craniofacial	7 (20.0)
Palmar	29 (82.9)
Axillary	8 (22.9)
Plantar	27 (77.1)
Body mass index (kg/m^2)	24.2±2.7
Compensatory hyperhidrosis	18 (51.4)

Categorical variables are shown as numbers with percentages, and continuous variables are shown as mean ± standard deviation.

Table 2 Perioperative outcomes of patients undergoing sympathectomy categorized by occurrence of compensatory hyperhidrosis

Characteristics	CH group (n=18)	No CH group (n=17)	P value
Age (years)	26.61±9.02	25.41±10.09	0.66
Male	11 (61.11)	9 (52.94)	0.88
Body mass index (kg/m^2)	23.58±4.17	25.52±6.41	0.36
Hyperhidrosis site			
Craniofacial	4 (22.22)	3 (17.65)	>0.99
Palmar	14 (77.78)	15 (88.24)	0.66
Axillary	6 (33.33)	2 (11.76)	0.23
Plantar	14 (77.78)	13 (76.47)	>0.99
Pneumothorax	0 (0.00)	0 (0.00)	>0.99
Satisfaction score (scale)	92.50±7.33	96.18±4.52	0.15

Categorical variables are shown as numbers with percentages, and continuous variables are shown as mean ± standard deviation. CH, compensatory hyperhidrosis.

sex, and body mass index of the two groups were similar. The site of primary hyperhidrosis was also comparable: palmar hyperhidrosis was most common—14 patients (77.78%) in the CH group and 15 patients (88.24%) in the no-CH group (P=0.66). Complications such as pneumothorax were not observed in either group. Both groups exhibited high satisfaction scores—92.50±7.33 in the CH group and 96.18±4.52 in the no-CH group (P=0.15). There was no statistically significant difference between the two groups' satisfaction scores.

Discussion

Thoracoscopic sympathectomy has long been considered an effective treatment for severe primary hyperhidrosis due to its ability to provide significant symptom relief. However, CH remains a major drawback, affecting over 50% of patients undergoing this procedure (3,4,15). CH has been linked to decreased patient satisfaction in several studies, although the majority of patients still express overall satisfaction and willingness to recommend the procedure (16,17). This paradox highlights the importance of addressing CH proactively to further enhance patient outcomes.

Efforts to make CH reversible or to minimize its impact have included various surgical modifications. Clipping of the sympathetic chain has been attempted to allow potential reversal by removing the clip in cases of severe CH. However, outcomes have been largely disappointing due to limited nerve regeneration and persistent symptoms (18-20).

Temporary bilateral TSNB offers a novel solution by enabling patients to experience temporary sympathectomy effects, including CH, before committing to permanent surgery (10,13). This approach empowers patients with the ability to make informed decisions and manage expectations. Our study confirms the accuracy and safety of TSNB, with no major complications reported and only two minor cases (3.85%) of pneumothorax resolved without intervention (Table S1). Importantly, TSNB provided predictive insights, allowing patients to weigh the benefits of symptom relief against the potential for CH. Among the 17 patients who declined sympathectomy after undergoing TSNB, 9 patients cited concerns about CH, while 8 patients experienced symptom improvement but found the relief insufficient to justify proceeding with sympathectomy, leading them to decline the procedure.

In our institution (Incheon St. Mary's Hospital), T3 sympathectomy was chosen based on two key principles: for craniofacial hyperhidrosis, it aimed to minimize CH; for palmar hyperhidrosis, it was selected to achieve maximal symptom relief, acknowledging the potential for increased CH. Despite CH occurring in 51.43% of patients who underwent sympathectomy, satisfaction scores remained high (97.73±19.41 out of 100). Further analysis revealed no statistically significant differences in satisfaction between patients who developed CH and those who did not (P=0.15),

suggesting that the opportunity to experience the procedure through TSNB contributed to patient confidence and satisfaction. These findings support TSNB as a valuable preoperative tool, not only for predicting CH but also for enhancing the patient-centered nature of hyperhidrosis treatment.

While promising, this study is not without limitations. Its retrospective design and relatively short follow-up period limit the scope of the findings. The relatively short follow-up period may have led to an underestimation of late-onset adverse events and CH. The absence of a control group that did not undergo TSNB further restricts direct comparisons. Future research with larger sample sizes, longer follow-up periods, and control groups will be essential to validate the obtained results and refine the predictive capabilities of TSNB. Additional exploration of alternative predictive measures or complementary techniques could also help minimize the occurrence of CH and improve surgical outcomes.

Conclusions

Temporary bilateral TSNB represents a significant advancement in the management of primary hyperhidrosis by addressing the challenge of CH. This study highlights TSNB's role in enabling patients to make well-informed surgical decisions by providing a temporary simulation of sympathectomy outcomes, including CH. Despite CH occurring at a rate of 51.43% after sympathectomy, patient satisfaction scores remained high, with those who developed CH reporting satisfaction levels comparable to those without CH, emphasizing the importance of the preoperative management of expectations. TSNB demonstrated safety and effectiveness as a predictive tool, and its integration into clinical practice could enhance patient-centered care. Further studies with larger sample sizes, control groups, and longer follow-up periods are needed to validate the obtained findings and refine predictive strategies for CH.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://jtd.amegroups.com/article/view/10.21037/jtd-2024-2145/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This study was conducted in accordance with the principle of the Declaration of Helsinki (as revised in 2013) and was approved by the Institutional Review Board (IRB) of Incheon St. Mary's Hospital, College of Medicine, the Catholic University of Korea (IRB approval No. OC24RISI0085). The requirement for informed consent was waived due to the retrospective nature of this study.

References

1. Tetteh HA, Groth SS, Kast T, et al. Primary palmoplantar hyperhidrosis and thoracoscopic sympathectomy: a new objective assessment method. Ann Thorac Surg 2009;87:267-74; discussion 274-5.
2. Baumgartner FJ, Bertin S, Konecny J. Superiority of thoracoscopic sympathectomy over medical management for the palmoplantar subset of severe hyperhidrosis. Ann Vasc Surg 2009;23:1-7.
3. Dumont P, Denoyer A, Robin P. Long-term results of thoracoscopic sympathectomy for hyperhidrosis. Ann Thorac Surg 2004;78:1801-7.

4. Rodríguez PM, Freixinet JL, Hussein M, et al. Side effects, complications and outcome of thoracoscopic sympathectomy for palmar and axillary hyperhidrosis in 406 patients. Eur J Cardiothorac Surg 2008;34:514-9.
5. Girish G, D'souza RE, D'souza P, et al. Role of surgical thoracic sympathetic interruption in treatment of facial blushing: a systematic review. Postgrad Med 2017;129:267-75.
6. Weksler B, Blaine G, Souza ZB, et al. Transection of more than one sympathetic chain ganglion for hyperhidrosis increases the severity of compensatory hyperhidrosis and decreases patient satisfaction. J Surg Res 2009;156:110-5.
7. Hwang JJ, Kim DH, Hong YJ, et al. A comparison between two types of limited sympathetic surgery for palmar hyperhidrosis. Surg Today 2013;43:397-402.
8. Lee SS, Lee YU, Lee JH, et al. Comparison of the Long-Term Results of R3 and R4 Sympathicotomy for Palmar Hyperhidrosis. Korean J Thorac Cardiovasc Surg 2017;50:197-201.
9. Joo S, Lee GD, Haam S, et al. Comparisons of the clinical outcomes of thoracoscopic sympathetic surgery for palmar hyperhidrosis: R4 sympathicotomy versus R4 sympathetic clipping versus R3 sympathetic clipping. J Thorac Dis 2016;8:934-41.
10. Miller DL, Force SD. Temporary thoracoscopic sympathetic block for hyperhidrosis. Ann Thorac Surg 2008;85:1211-4; discussion 1215-6.
11. Jeong JY, Park HJ, Park JK, et al. Predictive procedure for compensatory hyperhidrosis before sympathectomy: preliminary findings. Thorac Cardiovasc Surg 2014;62:434-8.
12. Jeong JY, Park SS, Sim SB, et al. Prediction of compensatory hyperhidrosis with botulinum toxin A and local anesthetic. Clin Auton Res 2015;25:201-5.
13. Lee J, Jeong JY, Suh JH, et al. Thoracoscopic sympathetic block to predict compensatory hyperhidrosis in primary hyperhidrosis. J Thorac Dis 2021;13:3509-17.
14. Han JW, Ahn S, Jeong JY, et al. Use of thoracoscopy for thoracic sympathetic nerve block in primary hyperhidrosis. Sci Rep 2023;13:1402.
15. Miller DL, Bryant AS, Force SD, et al. Effect of sympathectomy level on the incidence of compensatory hyperhidrosis after sympathectomy for palmar hyperhidrosis. J Thorac Cardiovasc Surg 2009;138:581-5.
16. Shabat S, Furman D, Kupietzky A, et al. Long-term Outcomes of Endoscopic Thoracoscopic Sympathectomy for Primary Focal Palmar Hyperhidrosis: High Patient Satisfaction Rates Despite Significant Compensatory Hyperhidrosis. Surg Laparosc Endosc Percutan Tech 2022;32:730-5.
17. Seo EK, Cho YE, Yoon DH, et al. Compensatory hyperhidrosis after thoracoscopic sympathectomy in essential hyperhidrosis. J Korean Neurosurg Soc 2001;30:486-92.
18. Lin CC, Mo LR, Lee LS, et al. Thoracoscopic T2-sympathetic block by clipping--a better and reversible operation for treatment of hyperhidrosis palmaris: experience with 326 cases. Eur J Surg Suppl 1998;(580):13-6.
19. Choi BC, Lee YC, Sim SB. Treatment of palmar hyperhidrosis by endoscopic clipping of the upper part of the T4 sympathetic ganglion. Preliminary results. Clin Auton Res 2003;13 Suppl 1:I48-51.
20. Kara M, Kose S, Ozkan B, et al. Does clip removal help for compensatory hyperhidrosis complicating thoracic sympathetic clipping? Clin Auton Res 2019;29:353-5.

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