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Sympathectomy in the treatment of hyperhidrosis: Is it an effective solution?

Hiperhidroz tedavisinde sempatektomi: Etkin bir çözüm yolu mu?

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ABSTRACT

Background: Primary hyperhidrosis affects 1-3% of the general population and occurs equally in both genders. It significantly affects the quality of life. In recent years, endoscopic thoracic sympathectomy (ETS), especially with a single-port approach, has gained popularity in the treatment of primary hyperhidrosis. This study aims to assess the efficacy and clinical outcomes of ETS surgery for primary hyperhidrosis.

Materials and Methods: The data of 30 patients who underwent bilateral ETS due to primary hyperhidrosis were examined retrospectively. 25 patients treated with a single port approach were included in the study, and 5 patients treated with a double port approach were excluded from the study. Preoperative evaluations and routine tests were performed. Patients were evaluated in terms of age, gender, complications, satisfaction, compensatory sweating, and relapse. Patients' satisfaction levels were determined by telephone interviews.

Results: The mean patient age was 24.16 ± 6.01 years; 56% were men and 44% were women. As complications, compensatory hyperhidrosis was observed in 12% of the patients, and mild pneumothorax was observed in 12%. No operative mortality occurred. No recurrence was observed during the long-term follow-up. In telephone surveys, 88% of patients reported satisfaction. Three patients with compensatory sweating were partially satisfied. No patient reported regret.

Conclusions: We believe that ETS is an effective option in the treatment of primary hyperhidrosis, with low morbidity and high patient satisfaction rates, despite the risk of compensatory sweating.

Keywords: Hyperhidrosis, Endoscopic thoracic sympathectomy, Compensatory sweating.

ÖZET

Amaç: Primer hiperhidrozis, genel popülasyonun %1-3'ünü etkiler ve her iki cinsiyette de eşit oranda görülür. Yaşam kalitesini önemli ölçüde etkilemektedir. Son yıllarda, özellikle tek port yaklaşımıyla endoskopik torasik sempatektomi (ETS), primer hiperhidrozisin tedavisinde popülerlik kazanmıştır. Bu çalışma primer hiperhidroziste ETS ameliyatının etkinliğini ve klinik sonuçlarını değerlendirmeyi amaçlamaktadır.

Materyal ve Metot: Primer hiperhidrozis nedeniyle iki taraflı ETS uygulanan 30 hastanın verileri geriye dönük olarak incelendi. Çalışmaya tek port yaklaşımıyla tedavi edilen 25 hasta dahil edildi, çift port uygulanan 5 hasta çalışma dışı bırakıldı. Ameliyat öncesi değerlendirmeler ve rutin testler yapıldı. Hastalar yaş, cinsiyet, komplikasyonlar, memnuniyet, kompensatuvar terleme ve nüks açısından değerlendirildi. Hastaların memnuniyet düzeyleri telefon görüşmesi ile belirlendi.

Bulgular: Ortalama hasta yaşı $24,16 \pm 6,01$ idi; %56'sı erkek ve %44'ü kadındı. Komplikasyon olarak hastaların %12'sinde kompensatris hiperhidrozis ve %12'sinde hafif pnömotoraks görüldü. Operatif mortalite meydana gelmedi. Uzun süreli takipte herhangi bir nüks görülmedi. Telefon anketlerinde hastaların %88'i memnuniyet bildirdi. Kompensatuvar terleme olan üç hasta kısmen memnundu. Hiçbir hasta pişmanlık bildirmede.

Sonuç: Primer hiperhidrozis tedavisinde kompensatuvar terleme riskine rağmen düşük morbidite ve yüksek hasta memnuniyet oranları ile ETS'nin etkili bir seçenek olduğuna inanıyoruz.

Anahtar Kelimeler: Hiperhidroz, Endoskopik torasik sempatektomi, Kompansatuvar terleme.

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INTRODUCTION

Hyperhidrosis is a sweating disorder characterized by excessive stimulation of cholinergic receptors in the eccrine glands. This condition is divided into two main types: primary and secondary. Primary hyperhidrosis manifests as bilateral, symmetric, focal excessive sweating in the axillary, palmar, plantar, and craniofacial regions without an underlying cause (Nicolini et al., 2019; Ocakcioglu et al., 2019; Ravendran et al., 2023). Secondary hyperhidrosis, on the other hand, is associated with an underlying disorder. The incidence of hyperhidrosis is between 1-3%, and it occurs equally in both genders. This condition typically affects adolescents or young adults (Ocakcioglu et al., 2019; Ng et al., 2018). In recent years, endoscopic thoracic sympathectomy (ETS) has gained increasing popularity among thoracic surgical interventions (Kaplan et al., 2015).

Our study aims to evaluate the effectiveness and clinical outcomes of ETS surgery in the treatment of primary hyperhidrosis.

MATERIALS AND METHODS

Data from 30 patients who underwent bilateral endoscopic thoracic sympathectomy (ETS) for primary hyperhidrosis between January 2015 and August 2023 were retrospectively reviewed. Among these patients, 25 patients treated with a single-port approach were included in the study. All patients included in the study came from other clinics and were dissatisfied or unsuccessful with non-surgical treatment. Patients underwent bilateral single-port ETS procedures in the same session by the same surgeon using a standard technique. The median operative time was 90 [55–100] min. For preoperative assessment, routine laboratory tests, chest X-rays, electrocardiography (ECG), cardiology and dermatology consultations were requested from all patients. Except for 3 patients who developed minimal postoperative pneumothorax, the other patients were discharged after being hospitalized for 1 day. Patients with pneumothorax were discharged on the 3rd day after lung expansion was achieved with oxygen therapy. No patient required intensive care postoperatively. All patients underwent outpatient clinic check-ups at the 1st week and 1st month post-op. Patients were evaluated based on age, gender, surgical technique, complications, patient satisfaction, compensatory sweating, and recurrence. The satisfaction status of the patients was assessed by phone interviews.

The questions asked in the survey to the patients were as follows:

1. Was there compensatory sweating after the surgery? (yes/no)

2. Are you satisfied with your condition after the surgery? (satisfied / partially satisfied / not satisfied / regretful)

For the second question, the response "partially satisfied" indicates a willingness to undergo surgery again despite the developed complications. The response "not satisfied" implies indecision about undergoing surgery due to complications. The response "regretful" signifies the person's absolute unwillingness to undergo surgery due to complications.

Surgical method

The patients were intubated with a double-lumen endotracheal tube under general anesthesia. Positioned on their backs with arms secured overhead, a single incision of 1-1.5 cm was made at the third intercostal space, either anterior or along the mid-axillary line. Using a 5 mm 0-degree optic, the sympathetic nerve extending downward beneath the endothoracic fascia in proximity to the vertebra was visualized (Figure 1a). The sympathetic ganglion and chain were cut using hook electrocautery at the T3 ganglion level in patients with hand sweating, at the T4 ganglion level in patients with axillary sweating, and at the T3-T4 ganglion levels in those with both hand and axillary sweating. Additionally, to reduce the possibility of recurrence, a 2 cm section laterally over the rib was cauterized to damage the Kuntz nerves. Care was taken to avoid damage to the stellate ganglion and intercostal vessels during the procedure. Post-procedure, the air within the thorax was released using a Nelaton catheter, and the incision was closed without the placement of a chest tube (Figure 1b). The same procedure was performed on the other side during the same session.



Figure 1. a) Intraoperative cauterization of the sympathetic chain of the patient who underwent ETS due to palmar hyperhidrosis. **b)** Intraoperative air evacuation from a single port entrance of the same patient.

Statistical analysis

In the statistical evaluation of the data to be obtained from our study, the distribution was defined by using the arithmetic mean, standard deviation, frequency, and percentages as descriptive measures of the frequency distribution. The normality test was checked with the Kolmogorov-Smirnov test. The SPSS 25.0 program was used to calculate the values.

Table 1. Demographic characteristics of the cases, symptom, and complications		
Gender	n (number of patients)	Ratio (%)
Male	14	56
Female	11	44
Hyperhidrosis		
Palmar (T3)	12	48
Axillary (T4)	3	12
Palmar+Axillary (T3-4)	10	40
Complications		
Compansatory sweating	3	12
Back	1	4
Abdomen	1	4
Thorax	1	4
Pneumothorax	3	12
Minimally	3	12
Tube Thoracostomy	-	-
Recurrence	-	-
Horner Syndrome	-	-
Bleeding	-	-

RESULTS

The average age of the patients was 24.16 ± 6.01 , with 14 males (56%) and 11 females (44%). Among the patients, 12 experienced hand sweating, 10 had both hand and axillary sweating, and 3 only had axillary sweating. Bilateral ETS procedure was performed on each of the 25 patients in the same session. The expansion of the lungs was evaluated postoperatively with the first-day chest X-ray, revealing mild pneumothorax in 3 cases (12%). Oxygen therapy was administered to patients with pneumothorax, and it spontaneously resolved without further intervention. No operative mortality was observed in any patient. Compensatory hyperhidrosis developed in 3 patients (12%). The demographic characteristics and clinical outcomes of the patients are presented in Table 1. Postoperatively, all patients were observed to have dry hands.

Long-term follow-up clinic examinations and telephone surveys were conducted postoperatively. All patients were reached in the follow-up visits after discharge (100%). No recurrence was observed in any of the patients. Mild compensatory sweating was detected in three patients (12%): one patient had localized sweating in the abdominal region, one in the back, and one in the chest. In the telephone satisfaction survey, 22 patients (88%) reported satisfaction, while the three patients with compensatory sweating expressed partial satisfaction. No patients were observed to be undecided or regretful. The long-term results of the postoperative satisfaction survey are summarized in Table 2.

Table 2. Long term patient satisfaction

Patient satisfaction	n (number of patients)	Ratio (%)
Satisfied	22	88
Partially satisfied	3	12
Not satisfied	-	-
Regretful	-	-

DISCUSSION

Hyperhidrosis treatments include methods such as aluminum salts, iontophoresis, botulinum toxin injections, and psychotherapy; however, the success of these methods is often limited. Currently, for patients with hyperhidrosis who do not respond to medical treatment, the surgical treatment method used is sympathectomy (Ocakcioglu et al., 2019; Toolabi et al., 2022).

The thoracic sympathetic chain extends on both sides of the spine beneath the parietal pleura and consists of 10 to 12 ganglia. ETS is performed by cutting specific levels of these ganglia and the pathways between them (Ocakcioglu et al., 2019). The sympathectomy method, first applied by Kotzaref in 1920 to treat hyperhidrosis, was not widely used in later years due to the requirement for extensive surgical incision (Hashmonai et al., 2003). Hughes performed the first endoscopic sympathectomy surgery in 1942 (Robertson et al., 2006). In a large series study including 530 patients, ETS surgery was reported to be a reliable method with low morbidity rates and high patient satisfaction (Görür et al. 2009). Similarly, in our study, a high rate of patient satisfaction (88%) was identified. Three patients with only compensatory sweating expressed partial satisfaction, stating that it did not affect their daily activities.

ETS operations can be performed using either a single-port or two-port approach. In a study comparing single-port and two-port approaches in patients with palmar hyperhidrosis, the single-port approach demonstrated better results in terms of pain and surgery duration (Chen et al., 2009). The preference for a thoracoscopic approach and avoiding additional port incisions lead to less damage to muscle tissue and intercostal nerves compared to traditional surgery. This results in reduced intensity and duration of postoperative pain, high patient satisfaction, and a faster return to full activity for the patient (Shanthanna et al., 2016). Therefore, in our study, we included patients who underwent the single-port technique for these reasons.

In ETS surgery, various applications exist concerning the type of sympathetic nerve blockade (Ocakcioglu et al., 2019). However, in a study despite these

differences, it was found that there was no significant difference in postoperative complications and patient satisfaction among different applications such as burning, cutting, and clipping (Whitson et al., 2007). In our study, the sympathetic chain in all patients was interrupted by using a hook cautery.

The effectiveness of surgical intervention is primarily related to cutting the sympathetic ganglion at the correct level. Various studies have been conducted to determine the correct level of sympathectomy. It is stated in the literature that especially cutting the T2 sympathetic ganglion and/or long segment cutting causes intense compensatory sweating (Ocakcioglu et al., 2019). Although there is no significant difference in treatment success between the excision of both T2 and T3 ganglia and excision of only T3 ganglion, limiting the level of denervation and not increasing to T2 level as much as possible has been suggested as the most appropriate approach in order to reduce the incidence of complications and obtain satisfactory results (Dewey and others 2006; Schmidt et al. 2006). In our study, we avoided a broad incision of the sympathetic chain and only incised the T3 ganglion in patients with only hand sweating, the T4 ganglion in patients with only axillary sweating, and both the T3 and T4 ganglia in patients with both hand and axillary sweating.

The most common complication of ETS is compensatory sweating, and its frequency varies between 3% and 98% in the literature among different surgical approaches (Raveglia et al., 2021; Ocakcioglu et al., 2019; Ng et al., 2018). The most significant factors associated with compensatory sweating are the manipulation extent of the sympathetic chain and the level of sympathetic denervation (Wolosker et al., 2016). In our study, we found a relatively low rate of compensatory sweating, identified as 12%.

This retrospective study has some limitations, such as a small number of patients and the absence of a control group. Planning a prospective study with a larger sample size, involving multiple centers, and employing a randomized controlled design could help us achieve more reliable and generalizable results in the future.

CONCLUSION

In conclusion, with advantages such as minimal postoperative pain, favorable cosmetic outcomes, and high patient satisfaction, ETS appears to be an effective solution in the treatment of primary hyperhidrosis.

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Conflict of Interest: The authors declare that there is no personal or financial conflict of interest within the scope of the study.

Author Contribution:

Idea/Concept: Özgür KATRANCIOĞLU; **Design:** Şule KARADAYI; **Supervision/Consulting:** Şule KARADAYI; **Data Collection and/or Processing:** Merve KARABACAK; **Analysis and/or Interpretation:** Özgür KATRANCIOĞLU; **Literature Review:** Merve KARABACAK; **Writing of the Article:** Özgür KATRANCIOĞLU; **Critical Review:** Şule KARADAYI.

REFERENCES

Chen, Y. B., Ye, W., Yang, W. T., Shi, L., Guo, X. F., Xu, Z. H., et al. (2009). Uniportal versus biportal video-assisted thoracoscopic sympathectomy for palmar hyperhidrosis. *Chinese Medical Journal*, 122(13), 1525-1528.

Dewey, T. M., Herbert, M. A., Hill, S. L., Prince, S. L., & Mack, M. J. (2006). One-year follow-up after thoracoscopic sympathectomy for hyperhidrosis: outcomes and consequences. *Annals of Thoracic Surgery*, 81(4), 1227-1232.

Görür, R., Yıldızhan, A., Türüt, H., Şen, H., Yiyit, N., Candaş, F., et al. (2009). Analysis of 530 sympathectomy operations performed for palmar hyperhidrosis and long-term results. *Turkish Journal of Thoracic and Cardiovascular Surgery*, 17(1), 28-32.

Hashmonai, M., & Kopelman, D. (2003). History of sympathetic surgery. *Clinical Autonomic Research*, 13(1), 16-19.

Kaplan, T., Ekmekçi, P., Koçer, B., & Han, S. (2015). Bilateral sympathectomy for hyperhidrosis without using single-lung ventilation. *Turkish Journal of Medical Sciences*, 45(4), 771-774.

Ng, T., & Milman, S. (2018). For sympathectomy, age is just a number. *Journal of Thoracic and Cardiovascular Surgery*, 156(4), 1757-1758.

Nicolini, E. M., Costa, V. O., Montessi, J., Rodrigues, G. A., Cangussu, V. V., Reis, A. F. M., & Marques Filho, F. V. (2019). Video-assisted thoracic sympathectomy: literature review. *Revista do Colégio Brasileiro de Cirurgiões*, 46(2), 2157.

Ocakcioglu, I. (2019). Single-Port Bilateral Endoscopic Thoracic Sympathectomy For The Treatment of Hyperhidrosis. *Van Medical Journal*, 26(1), 97-102.

Ravendran, K., Babu, B., Madouros, N., & Panagiotopoulos, N. (2023). Robotic sympathectomy for hyperhidrosis. *Cureus*, 15(1), e33885.

Raveglia, F., Orlandi, R., Guttadauro, A., Cioffi, U., Cardillo, G., Cioffi, G., & Scarci, M. (2021). How to prevent, reduce, and treat severe post sympathetic chain compensatory hyperhidrosis: state of the art. *Frontiers in Surgery*, 8, 814916.

Robertson, A. G., Russell, A. M., & Kirk, A. J. B. (2006). Endoscopic thoracic sympathectomy: a review. *European Journal of Plastic Surgery*, 29(2), 73-78.

Schmidt, J., Bechara, F. G., Altmeyer, P., & Zirngibl, H. (2006). Endoscopic thoracic sympathectomy for severe hyperhidrosis: impact of restrictive denervation on compensatory sweating. *Annals of Thoracic Surgery*, 81(3), 1048-1055.

Shanthanna, H., Aboutouk, D., Poon, E., Cheng, J., Finley, C., Paul, J., et al. (2016). A retrospective study of open thoracotomies versus thoracoscopic surgeries for persistent postthoracotomy pain. *Journal of Clinical Anesthesia*, 35(2), 215-220.

Toolabi, K., Parsaei, R., Farid, R., & Zamanian, A. (2022). Endoscopic thoracic sympathectomy for primary hyperhidrosis: predictors of outcome over a 10-year period. *Surgical Endoscopy*, 36(5), 3585-3591.

Whitson, B. A., Andrade, R. S., Dahlberg, P. S., & Maddaus, M. A. (2007). Evolution of clipping for thoracoscopic sympathectomy in symptomatic hyperhidrosis. *Surgical Laparoscopy, Endoscopy & Percutaneous Techniques*, 17(4), 287-290.

Wolosker, N., Milanez de Campos, J. R., & Fukuda, J. M. (2016). Management of compensatory sweating after sympathetic surgery. *Thoracic Surgery Clinics*, 26(4), 445-451.