

Primary focal hyperhidrosis; treatments of thoracoscopic surgery

ABSTRACT

Background: Primary hyperhidrosis is an excessive amount of sweating disorder that bothers the person in the palms, soles, axillae and craniofacial regions. Primary hyperhidrosis is seen in 4.8% of the general population. Topical cream, parasympatholytic drugs, iontophoresis and botulinum toxin are used in the treatment of hyperhidrosis. Thoracic sympathetic surgery is another treatment method for patients who do not respond to medical treatments. Outcomes of the surgical treatment of hyperhidrosis were aimed in the study.

Methodology: This study was done to include patients with a diagnosis of hyperhidrosis who admitted to hospital between Jan 2015 and Sep 2021. Digital data were analyzed by evaluating patients' age, gender, thyroid function tests, medical treatments, surgical methods, postoperative clinical features, length of hospital stay, complications and disease recurrence. According to the preference of the surgeon, it was done to operate with uniport or two ports in this method (sympathectomy or sympatholysis). However, a three-port or minithoracotomy was done due to insufficient exploration or bleeding. The statistical analysis of the study was done with the Chi-square test.

Results: The incidence of hyperhidrosis was 0.38%. It was mostly seen in the male gender and, in the ages of 18-28 ranges. Localization of sweating was most often palmar (43.3%) in primary hyperhidrosis. Stress was a factor that increased sweating. The most common surgical method was uni-port video-assisted thoracoscopic surgery (66%) and sympatholysis (85%) in this study. Compensatory sweating was 26.4% and, the recurrence rate was 5.7% in the postoperative period. Complications rates were hemothorax 5.6% and pneumothorax 1.8% in the surgery. The third port was required in 5.6% because of adhesions or bleeding or incomplete exploration, and unilateral mini-thoracotomy was required in 9.4% of patients. The average length of stay in the hospital was 3.1 days. Tube thoracostomy increased the length of stay by 1.6 days. The sweating control rate was 96.2% in the early postoperative period. There was no mortality in the patients.

Conclusions: Thoracic sympathetic surgery is successful in the treatment of primary hyperhidrosis and, there is no statistically significant difference between sympathectomy and sympatholysis.

Keywords: hyperhidrosis, primary, sympathectomy, surgery, treatment

INTRODUCTION

Primary hyperhidrosis is an excessive amount of sweating disorder that bothers the person in the palms, soles, axillae, and craniofacial regions. Up to 1.6% of children and adolescents younger than 18 years of ages and 4.8% of the general population seen primary hyperhidrosis [1,2]. Sweating helps regulate body temperature but excessive sweating negatively affects social activity and life. Mostly, surgical treatment is done in patients whose complaints continue after medical treatments. Patients with excessive sweating, usually use cream and/or tablet drugs. In addition, botox and iontophoresis treatments are done in regional sweating. The treatment option is surgery for patients with persistent sweating despite non-surgical treatments. The video-assisted thoracoscopic surgery (VATS) is frequently preferred in this stage. Thoracic sympathectomy, sympatholysis, sympaticotomy can be done endoscopically through VATS method. It aimed to investigate the surgical treatments and results of hyperhidrosis patients who were admitted to our clinic in the seven years in this study.

PATIENTS AND METHODS

The study was done to include patients with a diagnosis of hyperhidrosis **who were** admitted to the Department of Thoracic Surgery, the Ersin Arslan Training and Research Hospital between Jan 2015 and Sep 2021. Most of the necessary information was obtained by examining the digital data of our hospital. Some incomplete or insufficient informations (whether the complaints persist, how long the drug was used, etc.) **was learned** by consulting the follow-up patients. Digital data were analyzed by evaluating patients' age, gender, thyroid function tests, drugs, medical treatments, surgical methods, postoperative clinical features, length of hospital stay, complications and disease recurrence. Patients with hyperthyroidism and endocrinological pathological findings were excluded **from** the study. The patients included in the study, who used medical treatments (aluminum_hydroxychloride cream, bornaprine hydrochloride tablet and hyoscine-N-butylbromide tablet drugs recommended by physicians for the treatment of hyperhidrosis) for a minimum of 6 months, but whose complaints continued. Bilateral VATS was done as the standard surgical treatment technique in the study (Figure 1). Uni-port VATS was done in a position of approximately 45 degrees, with the arms abducted to both sides at 90 degrees, and the midaxillary line through the 4th intercostal space. Two-port VATS and three-port VATS were done on the lateral decubitus position from **the** midaxillary 4th intercostal space via the camera and facilitating port. According to the preference of the surgeon, it was done to operate with uniport or two ports in this method. However, three-port VATS or minithoracotomy was done due to insufficient intraoperative exploration, bleeding or no total collapse of the lung. According to the surgeon's preference or the risk of bleeding, it was done with thoracic sympathectomy or sympathectomy. **The** Chi-square test was used in the statistical analysis of the study. Ethical approval was received for the study.

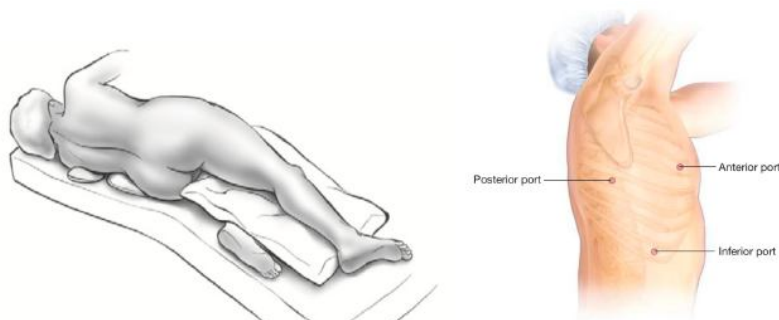


Figure 1. Position and port entries in VATS method (Master techniques in surgery, Douglas J. 2015)

RESULTS

Patients diagnosed with hyperhidrosis were identified, and admitted to the Department of Thoracic Surgery between January 2015 and September 2021. The data of 120 patients who were compatible with the study criteria were analyzed. The incidence of hyperhidrosis patients who **were** admitted to the department was found as 0.38%. The average age was 27 (med:25 range:8-67). Patients included in the study were 37.5% female (45) and 62.5% male (75). Patients with thyroid dysfunction were excluded **from** the study. Those were found **to use** of antidepressants to be 12.5% (15) and an increased in sweating with stress to be 29.1% (35). These were the localizations of sweating; 43.3% palmar (Figure 2), 18.3% palmar and axillae, 18.3% craniofacial and palmar, 7.5% palmar and plantar, 5.8% diffuse, 3.2% on cranial, 1.6% craniofacial and 1.6% palmar and abdomen sweating (Figure 3). All patients used topical cream for sweating and, 70% of the patients (84) used oral drugs.



Figure 2. Image of palmar sweating

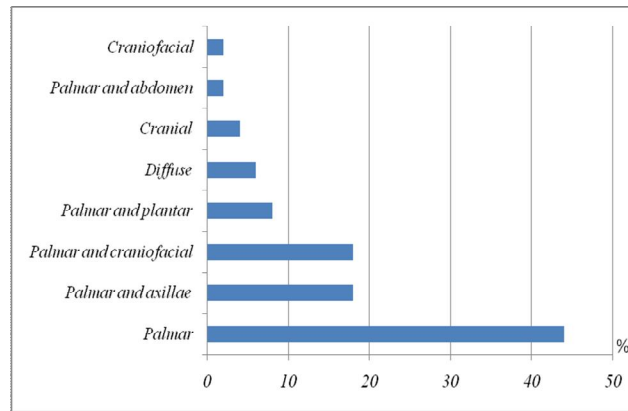


Figure 3. Localization of sweating in primary hyperhidrosis

Surgical treatment was done in 44.1% (53) of patients with a diagnosis of hyperhidrosis. Surgical techniques were bilateral uni-port VATS 66% (35), bilateral two-port VATS 18.8% (10), unilateral three-port VATS 5.6% (3), unilateral minithoracotomy 9.4% (4 right, 1 left) and unilateral uni-port VATS 9.4% (5). According to the surgeon's preference or the risk of bleeding; patients were done 85% (45) sympatholysis (Figure 4) and 15% (8) sympathectomy (Figure 5) as surgical treatment (Table 1).

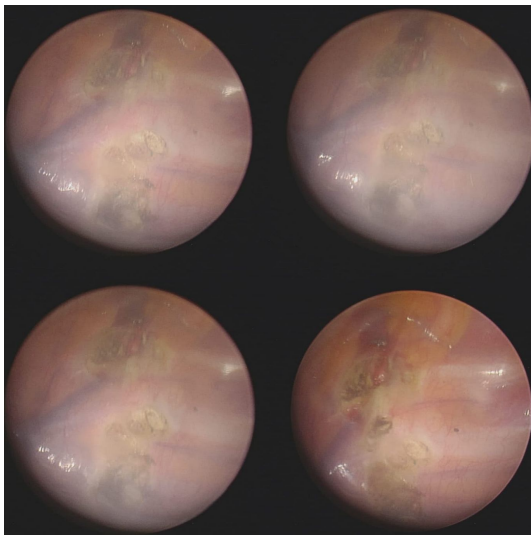


Figure 4. Image of sympatholysis surgery
*Thoracic sympathetic chain (T2-4)

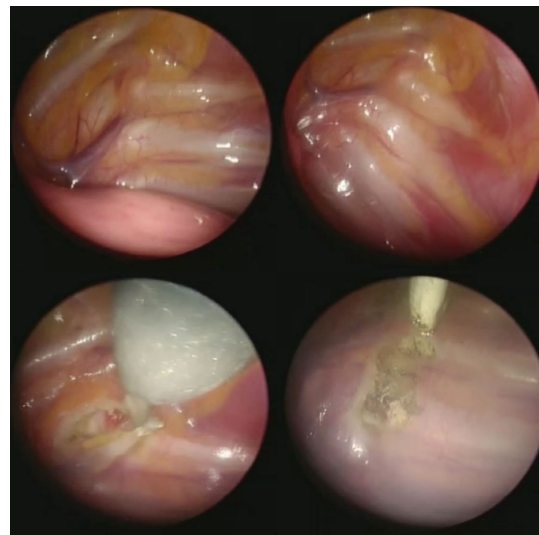


Figure 5. Image of sympathectomy surgery
*Thoracic sympathetic chain (T2-4)

Table 1. Distribution of surgical treatments

Three-port VATS and minithoracotomy were done due to bleeding, adhesion, lung damage and incomplete exploration

VATS: Video-assisted thoracoscopic surgery

Methods	Sympathectomy	Sympatholysis	Recurrence	Thorax tube	All patients
Uni-port VATS	2.90% (1)	97.1% (34)	5.7% (2)	0	66.0% (35)
Two-port VATS	20.0% (2)	80.0% (8)	10.0% (1)	10.0% (1)	18.8% (10)
Three-port VATS	66.7% (2)	33.3% (1)	0	66.7% (2)	5.70% (3)
Minithoracotomy	60.0% (3)	40.0% (2)	0	100% (5)	9.50% (5)

Sweating on the palmar and axillae cured completely in 96.2% (51) of patients in the postoperative period. Sweating decreased on the only right palmar in 3.8% (2) patients, but continued minimally. The **third** port was required in 5.6% (3) of patients because of visceroparietal adhesions, and unilateral minithoracotomy required in 9.4% (5) of patients. Tube thoracostomy wasn't performed in 84.1% (45) of the patients but required unilateral tube thoracostomy 15.1% (8) of patients (due to bleeding or air leak). **The stay** time of tube thoracostomy was

1.6 days (range:1-2). The length of stay in the hospital was 3.1 (range:2-4) days without tube thoracostomy and, 4.3 (3-5) days with tube thoracostomy in patients. Postoperative complications were found as 5.6% (3) bleeding and as 1.8% (1) air lake (due to damage of lung parenchyma) in patients. Compensatory sweating was 26.4% (14) and, the recurrence rate was 5.7% (3). The complete response rate after surgery was 94.4% (50) without recurrence. There was no mortality in the patients.

According to this study, the incidence of primary hyperhidrosis was 0.3%. It was more often in gentlemen ages 18-28 years (p:0.01). Primary focal hyperhidrosis was most commonly localized on the palmar. Stress was associated with excessive sweating (p:0.04). Surgical treatment was done at a rate of 44.1%. The surgeon's most preferred method was uni-port VATS (66%). Surgeries were done as 85% sympatholysis and 15% sympathectomy. It was found that 96.2% of success was achieved in the early postoperative period. Recurrence was seen in 5.7% of the patients in the first 6-month follow-up after surgery. Therefore, the success rate of surgery was calculated as 90.6% without recurrence. Treatments of 85% of the operated patients were completed without tube thoracostomy. The average length of stay in the hospital was 3.1 days. Tube thoracostomy increased the length of stay by 1.6 days (p:0.03). Bleeding was seen as an intraoperative complication in 7.6% of patients.

There was no mortality in the patients. Thoracic sympathetic surgery was successful in the treatment of primary hyperhidrosis (p:0.02, Table 2) and, there was no statistically significant difference between sympathectomy and sympatholysis (p:0.03).

Table 2. Statistical analysis of the study

Chi-square test was used in the statistical analysis of the study SD: Standard Deviation

P<0.05 was received as statistically significant with a 95% Confidence Interval (CI)

Parameters	Mean	SD (95%CI)
Age	27 (8-67)	3.67
Gender		
Male	62.5% (75)	
Female	37.5% (45)	
Length of stay in hospital (days)		
With tube thoracostomy	4.30 (3-5)	0.8
Without tube thoracostomy	3.10 (2-4)	0.4
	Complete response	Recurrence
Methods of surgery		
Uni-port VATS	0.01	0.05
Two-port VATS	0.05	0.04
Three-port VATS	0.06	
Minithoracotomy	0.07	
Type of sympathetic nerve surgery		
Sympathectomy	0.02	
Sympatholysis	0.03	0.06

DISCUSSION

Primary focal hyperhidrosis is excessive sweating that bothers the person. It negatively affects social life, daily activities and psychological mood. Three sweat glands are identified: eccrine, apocrine, and apocrine. Apocrine and apoeccrine sweat glands are located in the axilla. Eccrine glands are located throughout the body, especially on the palms, soles, and axillary. Eccrine glands are thought to be responsible for primary hyperhidrosis and, these glands are innervated by sympathetic nerves. Glands are activated by acetylcholine as a neurotransmitter and the hypothalamus acts as a regulator in sweating. The cause of this disorder is unclear, but it is defined as an abnormal response [3]. Topical therapy, iontophoresis, botulinum toxin A and anticholinergic drugs are used as treatment options. The disturbing symptoms of severe hyperhidrosis are a cause of somatic and psychiatric comorbidities [4]. This problem affects the social life negatively due to the patient's anxiety and embarrassing feelings. Non-surgical treatments include aluminum salts, botulinum, iontophoresis, and oral glycopyrronium. Some patients respond to non-invasive treatments, while others unfortunately continue to have symptoms. These

symptoms, which cause restrictions in daily activities, negatively affect the quality of life [5]. In patients whose complaints persist despite non-invasive treatments, surgical sympathectomy or sympatholysis is an effective treatment method.

The outcomes of treatments of thoracic surgery patients who didn't respond to medical treatments were examined in this study. Its incidence was reported as 4.8% in the general population. The primary hyperhidrosis rate was found to be 0.38% in patients who were admitted to our clinic in seven years in this study. It was more often in gentlemen ages of 18-28 years. Palmar, axillary and craniofacial sweating constituted the majority of the admitted to the clinic. Thoracoscopic sympathectomy is the preferred surgical treatment method for palmar and facial sweating [6]. Surgical treatment was done at a rate of 44.1% in this study. Surgical methods were 66% bilateral uni-port VATS and, 18.8% bilateral two-port VATS. Surgical techniques were done as 85% sympatholysis and, 15% sympathectomy in the patients. Postoperative compensatory hyperhidrosis is known as the most common complication and, it is at a rate of 50-70% in surgical treatments of primary hyperhidrosis [7]. Compensatory sweating is usually in the trunk and groin is mild and acceptable. The rate of compensatory hyperhidrosis was calculated to be 37.7% in the study. Pneumothorax, hemothorax, Horner's syndrome, pleuritic chest pain, recurrence, intercosto-brachial neuralgia and cardiovascular side effects are among other complications [8-10]. Unilateral minithoracotomy was done at 9.5% for reasons such as bleeding, visceroparietal adhesion, lung damage, and incomplete exploration in this study. Therefore, tube thoracostomy (6 right, 2 left) was required for 15% of the patients. These were seen at rates of 3.7% hemothorax and 5.6% pneumothorax in postoperative in the study. Pleuritic chest pain was seen in the vast majority of patients, and no Horner's syndrome or cardiac side effects. Recurrence was calculated at a rate of 5.7% (in the same localization within 6 months).

A satisfactory result was reported at a rate of 95% on palmar sweating in a study [11]. It was found that 96.2% of success was achieved in the early postoperative period. The success rate of surgery was calculated as 90.6% without recurrence in this study. In a study, it was reported that 71.6% of patients with thoracic sympathectomy had a hospital stay of 2-3 days, 6.4% were hospitalized in the Intensive-care Unit and there was no mortality [12]. Similar results were obtained in this study, the length of hospital stay was 1-3 days, admitted to the Intensive-care Unit was 5%, and mortality wasn't observed.

CONCLUSIONS

According to this study; the incidence of hyperhidrosis was 0.38% in patients admitted to the department of thoracic surgery. It was mostly seen in the male gender and, in the ages of 18-28 ranges. Localization of sweating was most often palmar in primary hyperhidrosis. The most common surgical method was uni-port VATS and sympatholysis in this study. Compensatory sweating was 26.4% and, the recurrence rate was 5.7% in the postoperative period. Complications rates were hemothorax 5.6% and pneumothorax 1.8% in the surgery. The average length of stay in the hospital was 3.1 days. Tube thoracostomy increased the length of stay by 1.6 days. The sweating control rate was 96.2% in the early postoperative period. There was no mortality in the patients. Thoracic sympathetic surgery is successful in the treatment of primary hyperhidrosis and, there is no statistically significant difference between sympathectomy and sympatholysis.

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Republic of Turkey Ministry of Health numbered 2021-09-18T23_48_37 and Gaziantep University Medical Ethics Committee numbered 2021/323

CONFLICT OF INTEREST

The author declared that there is no conflict of interest.

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REFERENCES

1. Doolittle J, Walker P, Mills T, et al. Hyperhidrosis: an update on prevalence and severity in the US. *Arch Dermatol Res.* 2016;308(10):743–749.
2. Strutton DR, Kowalski JW, Glaser DA, et al: US prevalence of hyperhidrosis and impact on individuals with axillary hyperhidrosis: Results from a national survey. *J Am Acad Dermatol* 2004;51:241-248.
3. Lonsdale-Eccles A, Leonard N, Lawrence C: Axillary hyperhidrosis: Eccrine or apocrine? *Clin Exp Dermatol* 2003;28:2-7.
4. Mattias AS H, Dorra B, Gregor BE J. Treatment of hyperhidrosis. *Am J Clin Dermatol* 2022;23(5):635-646.
5. Henning MAS, Ibler KS, Loft I, Ostrowski SR, et al. The health-related quality of life in hyperhidrosis and comorbidities. *Qual Life Res*; 2022.
6. Drott C, Gothberg G, Claes G. Endoscopic transthoracic sympathectomy: an efficient and safe method for the treatment of hyperhidrosis. *J Am Acad Dermatol* 1995; 33:78–81.
7. Chiou TS, Chen SC. Intermediate-term results of endoscopic transaxillary T2 sympathectomy for primary palmar hyperhidrosis. *Br J Surg* 1999; 86:45–47.
8. Gossot D, Kabiri H, Caliandro R, Debrosse D, Girard P, Grunenwald D. Early complications of thoracic endoscopic sympathectomy: a prospective study of 940 procedures. *Ann Thorac Surg* 2001; 71:1116–1119.
9. Lai YT, Yang LH, Chio CC, Chen HH. Complications in patients with palmar hyperhidrosis treated with transthoracic endoscopic sympathectomy. *Neurosurgery* 1997; 41:110–115.
10. Kingma R, TenVoorde BJ, Scheffer GJ, Karemaker JM, Mackaay AJ, Wesseling KH, de Lange JJ. Thoracic sympathectomy: effects on hemodynamics and baroreflex control. *Clin Auton Res* 2002; 12:35–42.
11. Young O, Neary P, Keaveny TV, Mehigan D, Sheehan S. Evaluation of the impact of transthoracic endoscopic sympathectomy on patients with palmar hyperhidrosis. *Eur J Vasc Endovasc Surg* 2003; 26:673–676.
12. Marcelo FAS, Andressa CSL, Marcelo PT, Nickolas S, et al. Population-based analysis of the epidemiology of the surgical correction of hyperhidrosis in 1216 patients over 11 years: a cross-sectional study. *Sao Paulo Med J.* 2022;140(6):775-780.