

## 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. 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, three-port or minithoracotomy was done due to insufficient exploration or bleeding. The statistical analysis of the study was done with Chi-square test.

**Results:** The incidence of hyperhidrosis was 0.38%. It was mostly seen in male gender and, in the ages of 18-28 ranges. Localization of sweating was most often palmar (43.3%) in the 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, recurrence rate was 5.7% in the postoperative period. Complications rates were hemothorax 5.6% and pneumothorax 1.8% in the surgery. Third port was required in 5.6% because of adhesions or bleeding or incomplete exploration, and unilateral minithoracotomy required in 9.4% of patients. The average length of stays in the hospital were 3.1 days. Tube thoracostomy was increased the length of stay by 1.6 days. Sweating control rate was 96.2% in the early postoperative period. There were 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.

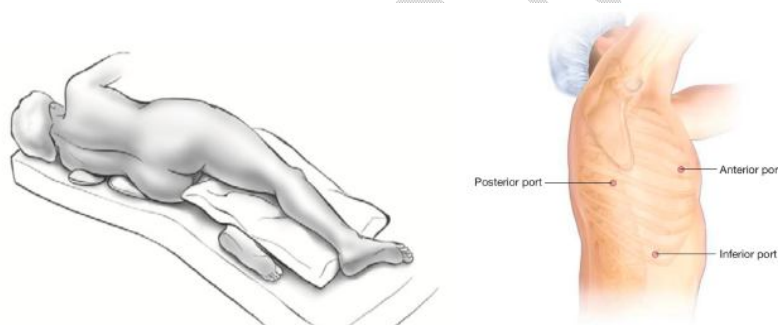
**Keywords:** hyperhidrosis, primary, sympathectomy, surgery, treatment

### 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 is helps regulate of 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 was aimed to investigate the surgical treatments and results of hyperhidrosis patients who 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 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.) were 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 in the study. The patients were 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 I). 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 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. Chi-square test was used in the statistical analysis of the study. Ethical approval was received for the study.



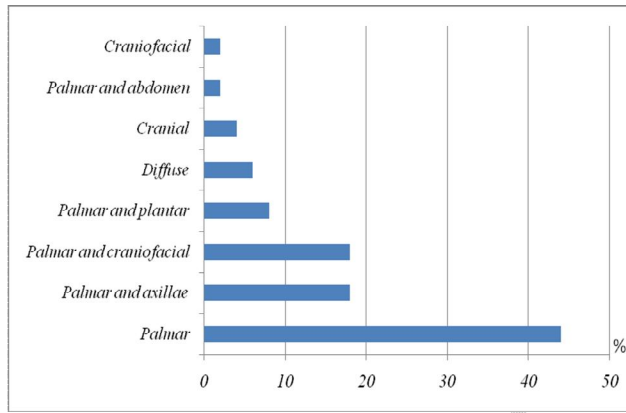
*Figure I. Position and port entries in VATS method (Master techniques in surgery, Douglas J. 2015)*

## RESULTS

Patients diagnosed with hyperhidrosis were identified, who 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 admitted to the department was found as 0.38%. 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 in the study. Those were found used of antidepressant to be 12.5% (15) and increased in sweating with stress to be 29.1% (35). These were the localizations of sweating; 43.3% palmar (Figure II), 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 III). All patients used topical cream for sweating and, 70% of the patients (84) were used oral drugs.

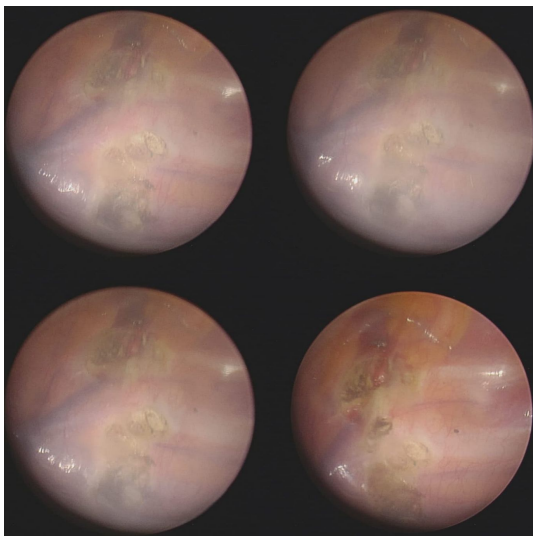


**Figure II. Image of palmar sweating**

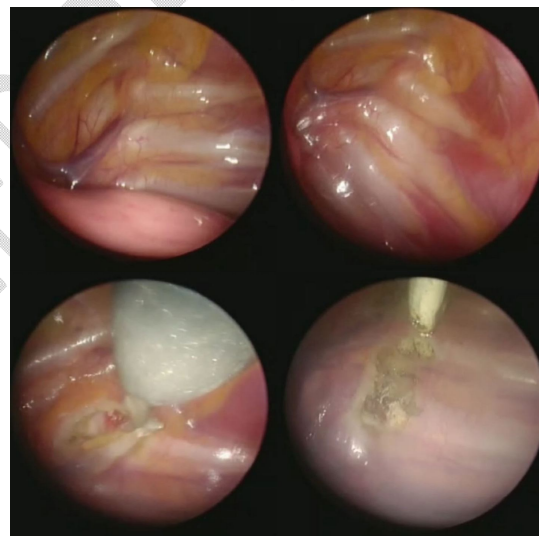


**Figure III. Localization of sweating in primary hyperhidrosis**

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 IV) and 15% (8) sympathectomy (Figure V) as surgical treatment (Table I).



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



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

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)

**Table I. Distribution of surgical treatments in the study**

\*Three-port VATS and minithoracotomy were done due to bleeding, adhesion, lung damage and incomplete exploration \*VATS: Video-assisted thoracoscopic surgery

Sweating on the palmar and axillae cured completely in 96.2% (51) patients in the postoperative period. Sweating decreased on the only right palmar in 3.8% (2) patients, but continued minimally. 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). Stay time of tube thoracostomy was 1.6 days (range:1-2). The length of stay in the hospital were 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, recurrence rate was 5.7% (3). The complete response rate the after surgery was 94.4% (50) without recurrence. There were no mortality in the patients.

According to this study, the incidence of primary hyperhidrosis was 0.3%. It was more often in gentlemen and ages of 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% success was achieved in the early postoperative period. Recurrence was seen in 5.7% of the patients in the first 6-months 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 stays in the hospital were 3.1 days. Tube thoracostomy was 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 were no mortality in the patients. Thoracic sympathetic surgery was successful in the treatment of primary hyperhidrosis (p:0.01, Table II) and, there was no statistically significant difference between sympathectomy and sympatholysis (p:0.03).

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

**Table II. 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 statistically significant with a 95% Confidence Interval (CI)

## 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 apoecrine. Apocrine and apoecrine 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 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 uses as treatment options.

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. Primary hyperhidrosis rate was found to be 0.38% in patients who admitted to our clinic in seven years in this study. It was more often in gentlemen and ages of 18-28 years. Palmar, axillary and craniofacial sweating were constituted the majority of the admitted to clinic. Thoracoscopic sympathectomy is the preferred surgical treatment method in palmar and facial sweating [4]. 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, as 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 [5]. Compensatory sweating is usually in the trunk and groin as 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 [6-8]. Unilateral minithoracotomy was done as 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 as 15% of the patients. These were seen at rates of 3.7% hemothorax and 5.6% pneumothorax in postoperative in the study. The 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 [9]. It was found that 96.2% success was achieved in the early postoperative period. The success rate of surgery was calculated as 90.6% without recurrence in this study. There were no mortality in the patients.

## 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 male gender and, in the ages of 18-28 ranges. Localization of sweating was most often palmar in the primary hyperhidrosis. The most common surgical method was uni-port VATS and sympatholysis in this study. Compensatory sweating was 26.4% and, 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 stays in the hospital were 3.1 days. Tube thoracostomy was increased the length of stay by 1.6 days. Sweating control rate was 96.2% in the early postoperative period. There were 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.

## ETHICAL APPROVAL

Republic of Turkey Ministry of Health numbered 2021-09-18T23\_48\_37 and Gaziantep University Medical Ethics Committee numbered 2021/323

## 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* 28:2-7, 2003
4. 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.
5. Chiou TS, Chen SC. Intermediate-term results of endoscopic transaxillary T2 sympathectomy for primary palmar hyperhidrosis. *Br J Surg* 1999; 86:45–47.
6. 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.
7. Lai YT, Yang LH, Chio CC, Chen HH. Complications in patients with palmar hyperhidrosis treated with transthoracic endoscopic sympathectomy. *Neurosurgery* 1997; 41:110–113.
8. 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.
9. 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.