

# Efficacy of Videothoracoscopic Sympathectomy For Concurrent Palmo-Axillary Hyperhidrosis: Quality Of Life Change and Patient Satisfaction

Eşzamanlı Palmo-Aksiller Hiperhidrozis Tedavisinde Videotorakoskopik Sempatektominin Etkinliği: Yaşam Kalitesi Değişimi ve Hasta Memnuniyeti

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## Abstract

**Introduction** Primary hyperhidrosis is a condition of excessive sweating that severely limits a person's social life. We aimed to investigate factors affecting the quality of life and patient satisfaction in patients undergoing videothoracoscopic sympathectomy for concurrent palmo-axillary hyperhidrosis.

**Materials and Methods** We evaluated 126 patients who underwent videothoracoscopic sympathectomy for primary concurrent palmo-axillary hyperhidrosis. The data were analyzed retrospectively in terms of postoperative complications and factors affecting the quality of life.

**Results** A total of 251 videothoracoscopic sympathectomy operations were performed, 53.2% (n:67) of the patients were female and 46.8% (n:59) were male. The mean age was 24.3±7 (min-max:15-51), whereas the mean body mass index was 23.5±4 (min-max:16.9-34.9). The mean length of hospital stay was 1.3±0.9 days (Min-Max: 1-6). Ten (7.9%) patients underwent T3 sympathectomy, and 116 (92.1%) patients underwent T3 and T4 sympathectomy. Complications were observed in a total of 13 (10.3%) patients. The most common complication was pneumothorax (n:10, 7.9%). Compensatory hyperhidrosis was observed in 23 patients (18.3%). A significant correlation was detected between compensatory hyperhidrosis and patient satisfaction (p<0.001). A statistically significant improvement was observed in the quality of life of all patients after videothoracoscopic sympathectomy (p<0.001).

**Conclusion** Videothoracoscopic sympathectomy improves the postoperative quality of life in patients with concurrent palmo-axillary hyperhidrosis. The complication rate is low, and the chance of success is quite high in sympathectomies performed at T3 and T3-T4 levels. As the severity of sweating increased, patient satisfaction decreased.

**Keywords** Hyperhidrosis, sympathectomy; compensatory hyperhidrosis; thoracoscopy; quality of life

## Öz

**Amaç** Primer hiperhidrozis, kişinin sosyal yaşantısını ciddi şekilde kısıtlayan, vücudun bir veya birden fazla bölgesinde görülen aşırı terleme durumudur. Eşzamanlı palmo-aksiller hiperhidrozis nedeniyle videotorakoskopik sempatektomi uygulanan hastalarda, postoperatif komplikasyonları değerlendirdik ve cerrahinin sonuçlarının, hasta memnuniyeti ve yaşam kalitesi üzerine etkisini araştırdık.

**Yöntem ve Gereçler** Primer eşzamanlı palmo-aksiller hiperhidrozis nedeniyle videotorakoskopik sempatektomi uygulanan 126 hastanın verileri, postoperatif komplikasyonlar ve yaşam kalitesini etkileyen faktörler açısından retrospektif olarak incelendi. Kompansatuar hiperhidrozis insidansı ve hasta memnuniyeti ilişkisi analiz edildi.

**Bulgular** Hastaların %53.2'ü (n:67) kadın ve %46.8'i (n:59) erkek idi. Ortalama yaş 24.3±7 (min-max:15-51), vücut kitle indeksi 23.5±4 (min-max:16.9-34.9). Ortalama hastanede kalış süresi 1.3±0.9 gündü (Min-Max: 1-6). On (%7.9) hastaya T3 seviyesinde, 116 (%92.1) hastaya T3 ve T4 seviyesinde sempatektomi uygulandı. Toplam 13 (%10.3) hastada komplikasyon görüldü. En sık görülen komplikasyon, pnömotoraks idi (n:10, %7.9). Yirmi üç hastada (%18.3) kompensatuar hiperhidrozis gözlemlendi. Kompansatuar hiperhidrozis en sık sırt ve ayak bölgesinde izlendi (n:14, %11). Kompansatuar hiperhidrozis ile hasta memnuniyeti arasında istatistiksel açıdan anlamlı ilişki bulundu (p<0.001). Postoperatif komplikasyonları etkileyen istatistiksel açıdan anlamlı bir parametre saptanmadı (p<0.05) (Tablo 2). Videotorakoskopik sempatektomi sonrası tüm hastaların yaşam kalitesinde istatistiksel olarak anlamlı iyileşme gözlemlendi (p<0.001).

**Sonuç** Videotorakoskopik sempatektomi, eşzamanlı palmo-aksiller hiperhidrozis hastalarında postoperatif yaşam kalitesini artırmaktadır. T3 ve T3-T4 seviyelerinde yapılan sempatektomilerde komplikasyon oranı düşük olup başarı şansı oldukça yüksektir. Kompansatuar hiperhidrozis şiddeti arttıkça hasta memnuniyeti azalır.

**Anahtar Kelimeler** Hiperhidroz; sempatektomi; kompensatuar hiperhidroz; torakoskopi; yaşam kalitesi



## INTRODUCTION

Primary hyperhidrosis is, excessive sweating caused by abnormal stimulation of sweat glands by the sympathetic nervous system. This situation significantly limits the person's daily activities, causing serious social and psychological problems. Hyperhidrosis affecting regions axilla, palms, face, and feet, can be observed in only one of these regions or several regions simultaneously. Palmo-axillary hyperhidrosis brings about a significant deterioration in the quality of life of patients.<sup>1</sup>

Although there are many current methods in the treatment of primary hyperhidrosis, only sympathectomy provides curative results. Videothoroscopic sympathectomy (VTS) is accepted as the gold standard method in the treatment of primary hyperhidrosis.<sup>2</sup>

Sympathectomy is mostly preferred in the primary hyperhidrosis treatment in the palmar, axillary, and facial regions. The success rate in patients undergoing VTS is quite high. Compensatory hyperhidrosis (CH) occurred after VTS surgery, emerges as a crucial problem in the postoperative period.<sup>3</sup>

Although there are many studies in the literature about the level of sympathectomy and complications limited data on the relationship between postoperative CH, long-term patient satisfaction, and quality of life are encountered.<sup>4</sup> We think that patient satisfaction and quality of life change are the fundamental factors showing the long-term effectiveness of thoroscopic sympathectomy.

In our study, in which we examined the early and long-term results of patients who underwent sympathectomy due to concurrent palmo-axillary hyperhidrosis (PAH), we aimed to reveal the factors affecting patient satisfaction. Besides, we evaluated the impact of VTS on quality of life.

## MATERIALS and METHODS

The ethics committee approval of this study was acquired

from the institutional review board (No: E-71522473-050.01.04-145717-161) and conducted in accordance with the principles of the Declaration of Helsinki.

A retrospective analysis was conducted with 126 patients undergoing VTS for primary PAH between 2015 and 2020. Preoperative hemograms, biochemistry, and coagulation tests of all patients were examined. Possible metabolic diseases were excluded, especially thyroid function tests (T3, T4, TSH) were routinely evaluated. Cardiac evaluations were carried out by electrocardiogram. Postoperative complications, factors affecting the quality of life and relationship between the incidence of CH and patient satisfaction were investigated. The data of the patients' gender, age, weight, height, body mass index (BMI), sweating area, developing complications, and length of stay in hospital were obtained from the hospital registry system and patient files.

### Patient selection and definitions

The patients included in the study had severe sweating complaints in the concurrent axilla and palms, negatively affecting their daily lives. Patients with only palmar or only axillary hyperhidrosis were excluded from the study. Patients with facial or plantar hyperhidrosis were also excluded from the study.

CH was defined as a new excessive sweating condition developed in another part of the body after a sympathectomy.<sup>5</sup>

Mild CH was defined as sweating generally being tolerated and not requiring a change of clothing, moderate CH was sweating in which the amount of sweating was higher but still did not require a change of clothing, and severe CH was excessive sweating requiring one or more clothing changes.<sup>5</sup> Outpatient follow-up of all patients was performed in the first week, 3rd month, 1st year, and 2nd year postoperatively. Control was assumed by questioning sweating conditions and performing a physical examina-

tion. In the case of CH, the region of sweating and the degree of sweating were recorded.

Evaluation of patient satisfaction was carried out using the Visual Analogue Scale (VAS).<sup>6</sup> Patients were classified into four groups: the completely satisfied group; who were completely satisfied with the improvement in their quality of life without complaints after VTS (VAS score  $\geq 9$ ), the satisfied group; who were satisfied with the improvement in their quality of life even with minor complaints (VAS score  $\geq 6-8$ ), the partially satisfied group; not improving their quality of life after sympathectomy (VAS score  $\geq 3-5$ ), and the group that would not recommend sympathectomy to other patients (VAS score  $\leq 2$ ). All patients were contacted by phone. After communicating and informing all patients by telephone, scale and scoring were performed. Patients were evaluated out of ten points.<sup>6</sup> Life qualities of patients were grouped as excellent, very good, good, poor, and very poor.<sup>7</sup>

### Surgical technique

The surgery was performed under general anesthesia, and all patients were intubated with a double-lumen endotracheal tube. The patients were placed in a semi-sitting position with the both arms in abduction. All were performed uniportal video-thoroscopic sympathectomy. As a standard, one incision was performed from the anterior axillary line, and the thorax was entered through the third intercostal space using a single port. A five mm 0° or 30° videothoracoscope was used in the operation.

After the sympathetic chain visualized, the parietal pleura was cut at the level of the third and fourth ribs to expose the sympathetic chain. T3 or T3-T4 sympathetic ganglia were cut with endoscopic hook electrocautery after suspending. Due to possible alternative nerve innervations, the relevant third or third and fourth rib surface was cauterized for 3 cm proximally. The lung was inflated with positive pressure ventilation. Following the evacuation of the air in the thorax using the catheter, the procedure was

terminated by removing the catheter. A chest tube was not inserted in the thorax. Later, the same procedure was performed on the opposite side in the same session. Routinely, the right side was preferred first for the procedure.

### Postoperative follow-up

Patients were awakened from anesthesia in the operating room and were followed up in the surgical intensive care unit until their general conditions stabilized. Patients were followed up by being monitored in the service for at least one day. Palmar temperature elevation was controlled. Postoperative P-A chest radiographs of the patients were routinely followed. In case of inadequate expansion in the chest X-ray; if there is an inadequate expansion below 20%, nasal oxygen therapy was performed on the patients. If the inadequate expansion was  $> 20\%$ , the patients were treated with closed underwater drainage by inserting a thorax tube. The patients were followed up with chest radiographs. Physical follow-up examinations were provided in the outpatient clinic for two years, including the first week, third month, first and second year postoperatively. The region of CH and the degree of sweating were recorded.

### Statistical analysis

Descriptive analyses were performed to provide information on the general characteristics of the study population. The Kolmogorov-Smirnov test was used to evaluate whether the distribution of variables was normal. Mann-Whitney U-test was used to compare the clinical and socio-demographic characteristics between the groups. The numerical variables were presented as the median and interquartile range (IQR). Categorical variables were compared by Chi-Square test and presented as a count and percentage. A p-value  $< 0.05$  was considered significant. Analyses were performed using commercial software (IBM SPSS Statistics, Version 23.0. Armonk, NY: IBM Corp.).

### RESULTS

A total of 251 successful VTS procedures were performed

on 126 patients. The mean age was 24.3±7 (Min-Max 15-51). 53.2% (n= 67) of the patients were female, and 46.8% (n= 59) were male. The mean BMI was 23.5±3.9 kg/m2 (Min-Max 16.9-34.9). The mean length of stay was 1.2±0.9 (Min-Max 1-6) days. Ten (7.9%) patients underwent T3 sympathectomy, and 116 (92.1%) patients underwent T3 and T4 sympathectomy. VTS was not performed on the left side in one patient due to the development of bradycardia. Palmar temperature elevation was observed in all patients postoperatively. Palm and axilla drynesses were achieved in all patients.

Postoperative complications were observed in 13 (10.3%) patients. The most common early-period postoperative complication was pneumothorax (n:10, 8%). Six of these patients were treated with nasal oxygen. Therefore, four patients had more severe pneumothoraxes and were treated with tube thoracostomy. Hemothorax was observed in two patients (1.6%). Both of these patients were those whose pleural adhesions were debrided during surgery due to pleuroparenchymal adhesions. All patients underwent revision with videothoracoscopy. Bradycardia developed in one patient (0.8%) while cutting the right T3. Bradycardia was medically treated. Mortality and Horner's syndrome were not observed in any patient (Table 1).

No significant prognostic factor affecting postoperative complications was found (p<0.05) (Table 2).

		n (%)
<b>Sex</b>	<b>Male</b>	59 (46,8)
	<b>Female</b>	67 (53,2)
<b>BMI, kg/m2 group</b>	<b>Underweight</b>	9 (9,2)
	<b>Normal weight</b>	54 (55,1)
	<b>Overweight</b>	31 (31,6)
	<b>Obese</b>	4 (4,1)
<b>Surgical level</b>	<b>T3</b>	10 (7,9)
	<b>T3-T4</b>	116 (92,1)
<b>Complication</b>	<b>No</b>	113 (89,7)
	<b>Yes</b>	13 (10,3)
<b>Complications</b>	<b>Bradycardia</b>	1 (7,7)
	<b>Hemothorax, revision</b>	2 (15,3)
	<b>Pneumothorax/right side</b>	5 (38,5)
	<b>Pneumothorax/left side</b>	5 (38,5)
<b>Compensatory Hyperhidrosis</b>	<b>Yes</b>	103 (81,7)
	<b>No</b>	23 (18,3)
<b>Severity of Compensatory Hyperhidrosis (CH)</b>	<b>Mild CH</b>	14 (60,9)
	<b>Moderate CH</b>	9 (39,1)
	<b>Severe</b>	0 (0)
<b>Site of CH</b>	<b>Sole</b>	6 (26,1)
	<b>Chest area</b>	3 (13)
	<b>Inguinal</b>	2 (8,7)
	<b>Back</b>	5 (21,7)
	<b>Back, sole</b>	2 (8,7)
	<b>Back, facial area</b>	1 (4,3)
	<b>Back, inguinal</b>	2 (8,7)
	<b>Back, facial area</b>	1 (4,3)
	<b>Inguinal, abdomen</b>	1 (4,3)

		<b>Complication</b>		<b>P</b>
		<b>No (n=113)(%)</b>	<b>Yes (n=13)(%)</b>	
<b>Sex</b>	<b>Male</b>	52 (46)	7 (53,8)	0,809
	<b>Female</b>	61 (54)	6 (46,2)	
<b>Age/years</b>		22 [8]	23 [5]	0,984
<b>Body Mass Index (BMI)</b>		23 [6,9]	21,3 [2]	0,155
<b>BMI, kg/m2 group</b>	<b>Underweight</b>	9 (9,7)	0 (0)	0,232
	<b>Normal weight</b>	49 (52,7)	5 (100)	
	<b>Overweight</b>	31 (33,3)	0 (0)	
	<b>Obese</b>	4 (4,3)	0 (0)	
<b>Surgical Level</b>	<b>T3</b>	7 (6,2)	3 (23,1)	0,068
	<b>T3-T4</b>	106 (93,8)	10 (76,9)	

Data were shown as median [IQR] and n (%).

Compensatory hyperhidrosis, patient satisfaction and quality of life CH was detected in 23 (18.2%) patients (Figure 1).

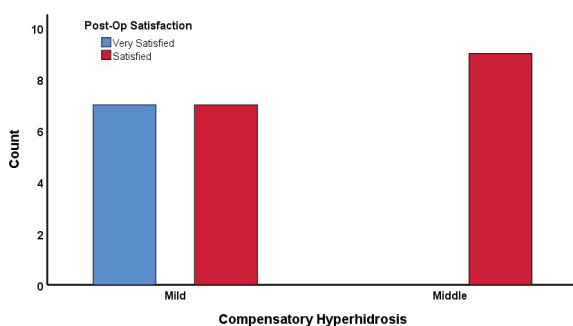


Figure 1. Comparison of postoperative patient satisfaction and severity of compensatory hyperhidrosis. As the severity of sweating increased, patient satisfaction decreased ( $p=0.019$ ).

While CH developed in 21 of these patients in the first three months, it was observed in the second year in two

patients. CH was most common in the back (n: 11), soles (n: 8), and inguinal region (n: 5) (Table 1). No significant correlation was found between surgical level (T3, T3-4) and CH ( $p=0.688$ ). No relationship was found between CH and patient characteristics (Table 3).

No recurrence was observed in any of our patients during the follow-up. The satisfaction of the patients was measured with the VAS scale. All of our patients reported that they were satisfied in the first week postoperatively. As a result of the two-year follow-up, 87.3% (n: 110) of our patients were very satisfied, 11.9% (n: 15) were satisfied, and 0.8% (n: 1) were partially satisfied. There was no patient who would not recommend sympathectomy to other patients. CH developed after VTS was found to be closely associated with patient satisfaction ( $p<0.001$ ). As the severity of sweating increased, patient satisfaction decreased ( $p=0.019$ ) (Figure 1). Other factors related to patient satisfaction were shown in the table 4.

		Compensatory Hyperhidrosis		P
		No (n=103)	Yes (n=23)	
Sex	Male	45 (43,7)	14 (60,9)	0,207
	Female	58 (56,3)	9 (39,1)	
Age/years		23 [9]	22 [6]	0,972
Length of hospital stay/day		1 [0]	1 [0]	0,326
Body Mass Index		22,9 [6,9]	23,7 [7,7]	0,790
BMI, kg/m2 group	Underweight	6 (7,5)	3 (16,7)	0,382
	Normal weight	46 (57,5)	8 (44,4)	
	Overweight	24 (30)	7 (38,9)	
	Obese	4 (5)	0 (0)	
Surgical Level	T3	9 (8,7)	1 (4,3)	0,688
	T3-T4	94 (91,3)	22 (95,7)	
Complication	No	94 (91,3)	19 (82,6)	0,254
	Yes	9 (8,7)	4 (17,4)	

Data were shown as median [IQR] and n (%).

**Table 3.** Relationship between patient's characteristics and compensatory hyperhidrosis

		Patient satisfaction		P
		very satisfied (n=110)	Satisfied	
Sex	Male	(n=16)	14 (60,9)	0,997
	Female	51 (46,4)	8 (50)	
Age/years		59 (53,6)	8 (50)	0,800
Length of hospital stay/day		23 [9]	22 [6]	0,953
Body Mass Index		1 [0]	1 [0]	0,830
BMI, kg/m2 group	Underweigh	22,9 [6,9]	22,9 [5,8]	0,742
	Normal weigh	7 (8,2)	2 (15,4)	
	Overweight	47 (55,3)	7 (53,8)	
	Obese	27 (31,8)	4 (30,8)	
Surgical Level	T3	4 (4,7)	0 (0)	1,000
	T3-T4	9 (8,2)	1 (6,3)	
Complication	No	101 (91,8)	15 (93,8)	0,670
	Yes	99 (90)	14 (87,5)	
	No	11 (10)	2 (12,5)	<0,001
	Yes	103 (93,6)	0 (0)	
	Mild CH	7 (6,4)	16 (100)	0,019
	Moderate CH	7 (100)	7 (43,8)	
	Severe CH	0 (0)	9 (56,3)	

Data were shown as median [IQR] and n (%).

Preoperatively, 85.7% (n:108) of the patients defined their quality of life as poor, and 18% (n:18) were very poor. Post-operatively, 86.5 (n:109) of the patients defined their quality of life as excellent, 12.6% (n:16) as very good, and 0.8% (n:1) as good. There was a significant improvement in the quality of life of all patients (p<0.001).

### DISCUSSION

PAH requires treatment because it is a condition affecting the quality of life of the individual and causing many psychosocial problems that limit daily activities. The treatment aims to increase the patient's quality of life by eliminating excessive sweating.

Currently, VTS is accepted as the gold standard treatment method for primary hyperhidrosis.<sup>2</sup> Considering the literature results, being a minimally invasive method and offering a reliable, effective, and curative treatment are the big-

gest advantages of VTS. A complete response in the range of 90%-100% is obtained in patients undergoing VTS. It is a very high success rate.<sup>3,8</sup>

There is a majority of opinion in the literature that the sympathectomy level has an effect on the success of the surgery. In a study comparing surgical levels, higher success was reported to be obtained in the T3-T4 sympathectomy group than in the T3 sympathectomy group.<sup>8</sup>

In another study comparing the group undergoing only T3 sympathectomy and the group undergoing only T4 sympathectomy, significantly higher success was explained to be achieved in the group undergoing T3 sympathectomy.<sup>9</sup> Cutting the T3 and T4 sympathetic ganglia together was clarified to increase the surgical success rate, and the success rate of isolated T4 sympathectomy in palmar sweating was low in the other research.<sup>10</sup>

In the current study, complete response was achieved in both palmar and axillary regions in all patients for whom we performed VTS. Contrary to the literature, there was no difference between the T3 sympathectomy group and the T3-T4 sympathectomy group.

CH is an undesirable situation for both the surgeon and the patient, which is common and difficult to cope with after a sympathectomy. Therefore, there are many studies in the literature about the factors affecting CH.<sup>11,12</sup> Compensatory sweating is observed at rates ranging from 11-96% after sympathectomy.<sup>13,14</sup> Yazbek et al.<sup>12</sup> reported that compensatory hyperhidrosis developed in 70% of the patients one year after the surgery in their prospective study.

Xie et al. reported that CH developed in 43% of patients undergoing T3 sympathectomy alone and in 12% of patients undergoing only T4 sympathectomy.<sup>9</sup> In another study, Yang et al. stated that the frequency of CH was observed more frequently in the T3-T4 sympathectomy group than in the T3 sympathectomy group.<sup>8</sup>

In contrast, Soares et al. reported that compensatory hyperhidrosis developed in 85% of patients after sympathectomy, and only 10% of these were intolerable. In the same study, they remarked that a significant relationship between surgical level and CH could not be found.<sup>2</sup>

On the other side, in many studies in the literature, there is an opinion related to a significant relationship between high body mass index and CH.<sup>3,15</sup>

Preoperatively, all of our patients had severe or very severe sweating in the palmo-axillary region. CH was seen in 18% of the patients postoperatively. There was no significant difference in the incidence of CH in patients undergoing only T3 or T3-T4 sympathectomy. The CH incidence was also independent of BMI. T2 sympathectomy is not preferred for palmar and axillary hyperhidrosis in our hospital. We think that the most significant reason for the lower

incidence of CH compared to the literature is our choice of this surgical level.

Pneumothorax is the most common postoperative complication after VTS.<sup>9,11</sup> Salim et al. indicated that pneumothorax developed in 23% of the patients in their study conducted with 120 patients.<sup>6</sup>

In the current study, the most common postoperative complication after VTS was pneumothorax (8%). In our opinion, this rate is high. However, we would like to point out that we do not routinely perform thoracic drains on patients in VTS surgery. On the other hand, inadequate drainage of the pleural cavity and residual pneumothorax without parenchymal damage explain this high rate. Although pneumothorax was observed in ten patients, the fact that only four of them required tube thoracostomy confirms this.

Patient satisfaction after VTS was reported between 66% and 97%.<sup>16,17</sup> In their study, Sobrinho et al. reported that after VTS, 88% of the patients were satisfied, 7% were partially satisfied, and 5% were unsatisfied.<sup>4</sup> Toolabi et al.<sup>3</sup> explained that 9% of the patients were not satisfied with the ETS surgery, and 4% did not recommend the surgery. In the study, low BMI was reported as an important factor determining patient satisfaction. Pure axillary hyperhidrosis is also stated as a negative predictor factor in patient satisfaction.<sup>3</sup>

In Yoon and Rim's study comparing the two groups undergoing T2-T3 sympathectomy and only T3 sympathectomy, CH was indicated to be detected more frequently after T2-T3 sympathectomy, and patient satisfaction decreased significantly after this surgery level.<sup>16</sup>

Horslen et al. reported 84% of CH after thoracoscopic sympathectomy. Despite this high rate, 93% of the patients pointed out that they would recommend ETS surgery to their friends in a similar situation.<sup>17</sup>

De compos et al. reported in their study that 96% of CH is observed after sympathectomy, and 37% of this is severe. On the other hand, they state that only 1.7% of the patients are not satisfied with the surgical procedure and do not recommend the operation. In the same study, an increase in BMI is specified to be associated with the development of CH.<sup>14</sup>

In our study, 87% of our patients stated that they were very satisfied with the VTS surgery, while 13% of the patients were satisfied or partially satisfied. The only factor impacting patient satisfaction after surgery was reported as the presence of CH. As the severity of CH increased, patient satisfaction decreased significantly.

The main goal in the treatment of primary hyperhidrosis is to enhance the quality of life. Quality of life measures has, thus, an essential place in evaluating the effectiveness of treatment. In the literature, there are some studies evaluating the quality of life before and after sympathectomy in patients with primary hyperhidrosis.<sup>2,4,14</sup>

In the long-term results published by Compos et al., 91% of the patients deduced that their quality of life improved after a sympathectomy. In the same study, researchers indicated that CH has a significant negative effect on the quality of life.<sup>14</sup>

In another study, in which a very high postoperative CH was reported, 86% of the patients showed an improvement in the long-term quality of life after surgery, and only 3% of the patients mentioned a decrease in their quality of life compared to the preoperative period.<sup>17</sup>

In a study consisting of patients with preoperative 95% poor or very poor quality of life, all patients were indicated to have a remarkable improvement in their quality of life after sympathectomy.<sup>2</sup>

Following the VTS, a significant improvement in the qual-

ity of life of all our patients was observed compared to the preoperative period.

Our study has some limitations. First, it has a retrospective design. Second, questionnaires were used to assess quality of life and patient satisfaction in patients with hyperhidrosis. It is difficult to reach reliable statistical results with questionnaires in a retrospective study. Despite these limitations, applying standardized procedures in these surgeries in our center is the strength of the study.

CH reduces patient satisfaction after a sympathectomy. Nevertheless, there is a distinct improvement in the patients' quality of life developing CH compared to the preoperative situation. It is possible to explain this situation by the fact that CH detection after surgery is more tolerable than the severity of sweating observed before surgery and affects less the quality of life.

In conclusion, VTS significantly improves the quality of life of patients with primary palmo-axillary hyperhidrosis. The severity of CH is the most crucial factor determining patient satisfaction in sympathectomy. Sympathectomy should be preferred in the treatment of PAH despite the adverse effects of CH.

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