Al-Azhar International Medical Journal

Volume 5 | Issue 4 Article 13

4-30-2024
Section: General Surgery

Efficacy of T3 Versus T3+T4 Thoracoscopic Sympathectomy for Primary Palmar and Plantar Hyperhidrosis

Alsayed Ahmed Hamdy
General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Mohammed Abd Al-Fattah Emam
General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Mustafa Alaulddin Mohammed Al-Bayati
General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, mustafaalaulddin@gmail.com

How to Cite This Article

Hamdy, Alsayed Ahmed; Emam, Mohammed Abd Al-Fattah; and Al-Bayati, Mustafa Alaulddin Mohammed (2024) "Efficacy of T3 Versus T3+T4 Thoracoscopic Sympathectomy for Primary Palmar and Plantar Hyperhidrosis," *Al-Azhar International Medical Journal*: Vol. 5: Iss. 4, Article 13.
DOI: https://doi.org/10.58675/2682-339X.2357

ORIGINAL ARTICLE

Efficacy of T3 Versus T3+T4 Thoracoscopic Sympathectomy for Primary Palmar and Plantar Hyperhidrosis

Alsayed A. Hamdy, Mohammed A. Emam, Mustafa A. M. Al-Bayati*

Department of General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Abstract

Background: ***Primary palmar hyperhidrosis is a medical condition characterized by excessive sweating, primarily but not exclusively on the palms. Frequently, it exerts a negative impact on the social interactions, educational pursuits, and professional endeavors of patients, potentially leading to varied degrees of psychological distress. Palmoplantar hyperhidrosis is a prevalent medical disorder characterized by excessive sweat secretion from the eccrine glands in the palms and soles.***

Aim and objective: ***To evaluate the effectiveness of T3 versus T3 and T4 thoracoscopic sympathectomy in treating simultaneous palmar and plantar hyperhidrosis cases.***

Patients and Methods: ***We conducted this study on 20 patients diagnosed with primary palmar and plantar hyperhidrosis. The General Surgery Department at Al-Azhar University selected these patients. The purpose of the study was to compare the outcomes of two different surgical procedures. In particular, 10 patients underwent T3 of the sympathetic chain (group A), while the remaining 10 underwent T3 and T4 of the sympathetic chain (group B).***

Results: ***There were no statistically significant differences seen among the study groups in terms of age, sex, BMI, chest tube insertion, satisfaction, bradycardia, post-operative compensatory perspiration, and post-operative dryness of hand and foot.***

Conclusion: ***Our investigation's findings confirm that sympathectomy performed at the T3 or T3+T4 levels offers effective and sustainable treatment for palmar and plantar hyperhidrosis.***

Keywords: Thoracoscopic Sympathectomy; Concurrent Palmar; Plantar Hyperhidrosis

1. Introduction

Primary palmar hyperhidrosis is a medical condition distinguished by excessive sweating, primarily on the palms. However, it may also manifest in other areas of the body. Frequently, patients experience negative impacts on their social interactions, educational pursuits, and professional endeavors, which can lead to varied degrees of psychological distress.[1]

A frequent disorder known as palmoplantar hyperhidrosis causes the eccrine (sweat) glands in the palms and soles to secrete excessive amounts of sweat. The illness may severely hinder social and professional functioning—a palm tree. Childhood is the onset age for idiopathic hyperhidrosis, which often runs in families.[2]

Since conservative methods are frequently insufficient to treat primary palmar hyperhidrosis, it has detrimental effects on both the body and the mind.[3]

The study revealed that the incidence rate of primary pulmonary arterial hypertension (PAH) in China was determined to be 4.59%. Furthermore, it was observed that this condition equally afflicted both males and females.[4]

Over the past 25 years, extensive case series and randomized trials have repeatedly provided evidence supporting the safety and efficacy of thoracoscopic interruption of the sympathetic chain as a therapeutic modality for focal primary hyperhidrosis.[5]

The efficacy of intradermal botulinum toxin injections in compensatory sweating has been seen in some patient populations.[6]

Accepted 14 April 2024.
Available online 30 April 2024

* Corresponding author at: General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt
E-mail address: mustafaalaulddin@gmail.com (M. A. M. Al-Bayati).

https://doi.org/10.58675/2682-339X.2357

One of the most prevalent and detrimental secondary consequences of sympathectomy is the occurrence of compensatory sweating, which manifests to varying degrees mainly in the regions of the back, belly, and lower limbs.[7]

Surgical intervention targeting the thoracic sympathetic chain has been observed to yield favorable outcomes in individuals who have undergone surgery for pulmonary arterial hypertension (PAH) and concurrently experience plantar hyperhidrosis (PLH). Various surgical techniques have yielded varying rates of relief for primary palmar hyperhidrosis (PLH). Notably, T2-T4 sympathectomy and T3-T4 sympathectomy or ganglion block have demonstrated better rates of relief. However, it is essential to note that T2-T4 sympathectomy may result in severe postoperative compensatory sweating.[8,9,10]

A further noteworthy characteristic of primary hyperhidrosis is the exclusive occurrence of sweating episodes during the patient's wakeful state. On the contrary, secondary hyperhidrosis manifests as a resultant condition of another underlying ailment. Sweating typically manifests in a generalized manner rather than confined to specific areas, and symptoms usually appear during adulthood. Episodes may manifest throughout periods of wakefulness or sleep in patients.[11]

The therapeutic approach for palmar, axillary hyperhidrosis, and facial blushing involves the process of sympathetic denervation targeting the specific anatomical region innervated by the sympathetic ganglia T2, T3, and T4.[12]

The objective can be accomplished through various methodologies, one of which involves the removal of the pertinent portion of the sympathetic chain, commonly referred to as sympathectomy. The process of dividing the chain, widely referred to as sympathectomy or sympathectomy, involves the utilization of instruments such as scissors, electric scalpel, or ultrasonic scalpel. Additionally, the chain can be obstructed through the application of clips.[13]

Thoracoscopic sympathectomy is a technique that is generally well-tolerated, with a low incidence of complications. Potential intraoperative consequences may encompass Pneumothorax, chylothorax, severe bleeding, lung injury, and phrenic nerve injury. These conditions are infrequent and can be mitigated using a thorough and cautious surgical approach. There is a remote possibility of encountering early postoperative Pneumothorax, pleural effusion, and Horner's syndrome. However, the likelihood of these complications occurring is minimal. Bradycardia is a potential consequence that, if it happens, is typically asymptomatic and of minimal clinical significance in most patients. Nevertheless, it is imperative to caution high-performance professional athletes regarding the potential impact on their physical capabilities and advise them of this risk before surgery.[11]

This research aims to evaluate the effectiveness of T3 Versus T3 & T4 Thoracoscopic Sympathectomy in treating simultaneous cases of palmar and plantar hyperhidrosis.

2. Patients and methods

Operative steps: Anesthesia: All patients were operated under general anesthesia with complete non-invasive monitoring using lung isolation via a double lumen endotracheal tube (Medtronic, USA) of appropriate size; patient positioning: The patient is positioned supine with a pad under the shoulder at the side which will be operated first. Then, tilting the operative table to 30° on the opposite side, the ventilation is blocked on the side of surgery (single lung ventilation). Semi-fowler (45° bed angulation) position may allow gravity to pull the upper lobes away from the field of dissection. The patients were secured to the operating table to prevent falling, skin incision site, and port placement. After excluding the lung from ventilation, A single port was created to facilitate the introduction of endoscopic tools, precisely positioned in the anterior axillary line at the third intercostal gap. A supplementary port was established in the mid-axillary line, namely at the fifth intercostal space, to facilitate the introduction of a telescope measuring 5-10 mm in diameter. Subsequently, a volume of 500 mL of carbon dioxide gas was introduced into the thoracic cavity to facilitate the slow deflation of the lung. The parietal pleura was incised along the primary sympathetic trunk utilizing diathermy.

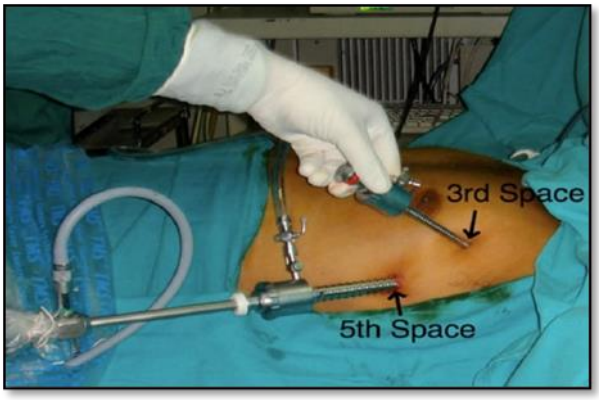


Figure 1. Bi-portal VATS.

This study was conducted on a sample of 20 individuals diagnosed with primary palmar and plantar hyperhidrosis and seeking treatment at the General Surgery Department of Al-Azhar University Hospitals. The purpose of the study was to compare the outcomes of two different surgical interventions. Specifically, 10 patients underwent CuttingT3 of the sympathetic chain (group A), while the remaining 10 underwent cutting of both T3 and T4 of the sympathetic chain (group B).

Inclusion criteria: Patients suffering from primary palmar & plantar hyperhidrosis and age above 18 years old.

Exclusion criteria: Severe cardio-pulmonary

insufficiency, presence of a history of severe pleural diseases (empyema, pleuritis), previous thoracotomy, coagulopathy, sympathectomies, chest tube insertion, and Inability to tolerate single-lung anesthesia (COPD, and contralateral pneumonectomy).

2.1.Methods

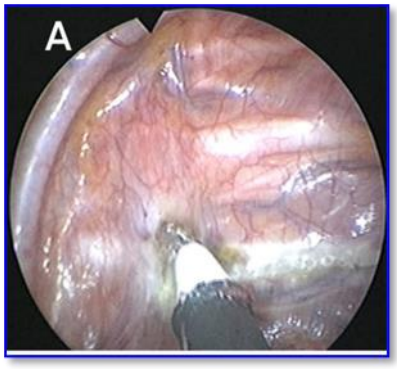
All the patients were subjected to the following: personal data, physical examination, laboratory investigations, electrocardiogram (ECG), and radiological investigations.

Operative technique: Preparation of skin: Showering on the night of the operation using an antiseptic solution after shaving axillary and thoracic hair if found. Premedication: Antibiotic prophylaxis was given.

The identification and exposure of the sympathetic chain involved the utilization of a thoracoscope. This procedure allowed for the straightforward identification of the sympathetic chain, which was found underneath the pleura. Additionally, it was observed that the sympathetic chain crossed the head of the ribs vertically. The ribs were employed as reference points for identifying the specific levels to address (R2-2ndrib, R3-3rd rib). The hook cautery is used to open the parietal pleura over the relevant level under video aid, utilizing a 5 mm trocar.

Ablation of the sympathetic chain: Using a Maryland grasper, the sympathetic chain and the ganglia were grasped and dissected away from their bed. The sympathetic chain was then cut using an endoscopic hook at the levels (R3-3rd).

Then, cauterization over the upper border of the 3rd rib, including the nerve of Kuntz, was done for a distance of 3-4 cm laterally using a Maryland or a hook cautery by diathermy to avoid any recurrence. In Group A, the sympathetic chain was transected at the level of the third rib using diathermy. (Group B) The sympathetic chain was surgically severed at the upper boundary of the third and fourth vertebrae.



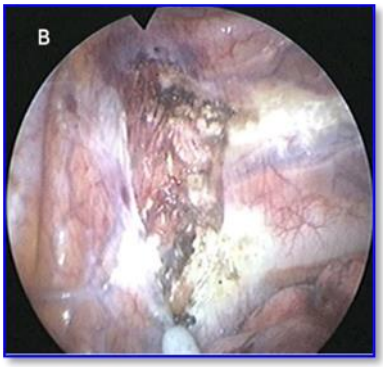


Figure 2. Cutting of sympathetic chain at rib 3(A) and rib 3, 4 (B).

Assessment of success of the procedure: After sympathetic chain cutting at the level of the third rib and level of third and fourth rebs, we observe the effect of the procedure as a slight decrease in the heart rate and by asking the anesthetist to check the patient hand to make sure that it was red, warm and dry.

Postoperative complications: They were detected through Complaints of dyspnea, pain, ptosis, and face dryness. General examination: pulse, temperature, blood pressure, respiration, and examination of the pupils. Chest examination: Inspection for unequal respiratory movement, Palpation for surgical emphysema, Percussion for detection of intrapleural collections (air or fluid), and auscultation for unequal air entry or additional sounds.

Postoperative radiological examination: All patients had a postoperative plain X-ray film P-A view after 6 hours. Ambulation: It was achieved early in the first night, encouraging the patient to attain his cough reflex and full respiratory movement.

Statistical analysis of the data

The data were inputted into the computer and subjected to analysis using IBM SPSS software package version 20.0 (Armonk, NY: IBM Corp). The qualitative data were represented using numerical values and percentages. The quantitative data were characterized by various statistical measures, including the range (minimum and most excellent values), the mean, the standard deviation, and the median. The statistical significance of the acquired results was assessed using a significance level of 5%.

The statistical tests employed in this study included the Chi-square test, Monte Carlo correction, and Student's t-test.

3. Results

Table 1. Comparison of demographic data between studied groups.

		GROUP A (N = 10)	GROUP B (N = 10)	STA T. TEST	P-VALUE
AGE (YEARS)	Mean	23.8	24	T = 0.078	0.939 NS
	±SD	5.3	6.1		
SEX	Male	30 %	20 %	X^2 = 0.26	0.605 NS
	Female	70 %	80 %		
SITE	Palmer	0	0	-----	-----
	Combined	10 0 0%	10 0 0%		
BMI (KG/M²)	Mean	21.9	22.05	T = 0.12	0.902 NS
	±SD	2.22	2.4		

T: independent sample T test. X2: Chi-square test. NS: p-value > 0.05 is considered non-significant.

There was no statistically significant difference between studied groups as regard age, sex and BMI.

Table 2. Comparison of intra-operative complications between studied groups.

		G ROUP A (N = 10)	G ROUP B (N = 10)	TAT. TEST	- VALUE
BLEEDING	o	0 00%	0 00%	---	---
	es	%	%		
CONVERSION THORACOTOMY	o	0 00%	0 00%	---	---
	es	%	%		

HS: p-value < 0.001 is considered highly significant. X2: Chi-square test.
NS: p-value > 0.05 is considered non-significant.

The presented table indicates that there was a complete absence of intra-operative bleeding and conversion to thoracotomy among all patients included in the study, encompassing 100% of the individuals in both groups.

Table 3. Comparison of post-operative compensatory sweat between studied groups.

		GROUP A (N = 10)		GROUP B (N = 10)		X^2	P-VALUE
CHEST TUBE	No	10	100%	9	90%	1.05	0.304 NS
	Yes	0	0%	1	10%		
SATISFACTION	No	4	40%	0	0%	1.25	0.263 NS
	Yes	6	60%	10	100%		
BRADYCARDIA	No	8	80%	9	90%	0.39	0.531 NS
	Yes	2	20%	1	10%		

S: p-value < 0.05 is considered significant. X2: Chi-square test. NS: p-value > 0.05 is considered non-significant.

There was no statistically significant difference between studied groups as regard chest tube insertion, satisfaction and bradycardia.

Table 4. Comparison of post-operative dryness of hand between studied groups.

		Group A (N=10)	*Group B (N=10)*	X^2	*P-value*
Compensatory sweat	Mild	4(40%)	6(60%)	1.51	0.469
	Moderate	5(50%)	4(40%)		NS
	Severe	1(10%)	0(0%)		

X2: Chi-square test. NS: p-value > 0.05 is considered non-significant.

There was no statistically significant difference between studied groups as regard post-operative compensatory sweat.

Table 5. Comparison of post-operative dryness of hand between studied groups.

		Group A (N=10)	*Group B (N=10)*	X^2	*P-value*
Dryness of hand	Complete	7(70%)	9(90%)	1.58	0.453
	Partial	2(20%)	1(10%)		NS
	Un-changed	1(10%)	0(0%)		

X2: Chi-square test. NS: p-value > 0.05 is considered non-significant.

There was no statistically significant difference between studied groups as regard post-operative dryness of hand.

Table 6. Comparison of post-operative dryness of foot between studied groups.

		Group A (N=10)	*Group B (N=10)*	X^2	*P-value*
Dryness of foot	Complete	2(20%)	6(60%)	3.4	0.175
	Partial	3(30%)	2(20%)		NS
	Un-changed	5(50%)	2(2%)		

There was no statistically significant difference between studied groups as regard post-operative dryness of foot.

4. Discussion

In a retrospective study conducted at Monte Sinai Hospital and University Hospital of the Federal University of Juiz de Fora, 521 patients diagnosed with primary hyperhidrosis were included. The study period spanned from January 2001 to December 2005. All patients underwent thoracic sympathectomy, specifically sympathetic chain interruption using diathermy. The patients were then categorized into three groups based on the level of interruption: group I consisted of 162 patients with interruption up to T2, group II included 65 patients with interruption up to T3, and group III comprised 294 patients with interruption up to T4. A high level of postoperative management success was observed in patients with palmar/axillary hyperhidrosis, with rates of 94% in group I, 89% in group II, and 80% in group III.[14]

In our study, 7 patients(70%) in the group (A) showed complete dryness of the hand, 2 patients (20%) with partial dryness of the hand, and one patient (10%)unchanged. In group (B), 9 patients (90%) showed complete dryness of the hand, and one patient (10%) with partial dryness of the hand.

In our study, 2 patients (20%) in the group (A) showed complete dryness of the foot, 3 patients (30%) with partial dryness of the foot, and 5 patients (50%) were unchanged. In group (B), 6 patients (60%) showed complete dryness of the foot, 2 patients (20%) with partial dryness of the foot, and 2 patients (20%) were unchanged.

The incidence of postoperative CS was found to be 67% among patients in groups I and II, while 61.29% of patients in group III had this complication. The incidence of severe cardiovascular disease (CS) was observed in 32% of patients in group I, 9% of patients in group II, and 4% of patients in group III.[14]

According to Kara et al. (year), the study sample consisted of 41 patients (78%) with mild-to-moderate CH and 4 patients (7%) with severe CH that caused significant distress. The findings of this study align with the existing body of research. In the conducted investigation, it was observed that all individuals diagnosed with severe CH were of the male gender. This outcome was ascribed to the observation that male patients exhibit more significant levels of perspiration compared to their female counterparts, which can be linked to greater striated muscle masses in males.[15]

In the present investigation, about cohort (A), it was shown that 4 individuals (40%) exhibited mild compensatory hyperhidrosis, while 5 individuals (50%) experienced moderate symptoms. The last patient (10%) presented with severe symptoms. Within group B, 60% of the patients experienced mild compensatory hyperhidrosis, while 40% exhibited moderate symptoms. None of the patients in this group presented with severe compensatory hyperhidrosis.

In their study, Dias et al. investigated the assessment of patients' quality of life (QoL) at two different time points following a surgical treatment known as endoscopic thoracic sympathectomy (ETS). The study sample consisted of 54 patients who underwent the ETS surgery at the T3-T4 level. The researchers specifically evaluated the QoL outcomes at 30 and 180 days postoperatively. The authors reported a noteworthy enhancement in the quality of life (QoL) for 93% of the patients. Dias et al. (year) additionally highlighted that individuals with hyperhidrosis experience fear and embarrassment as a result of their excessive sweating, which might contribute to the development of social phobia. The cohort above of

patients expressed an increased sense of subjective well-being after the surgical intervention. Furthermore, they had acquired a sense of self-assurance.[16]

In our study, 7 patients (70%) expressed satisfaction with the treatment in group (A), while 9 patients (90%) reported satisfaction with the procedure in group (B), indicating a significant enhancement in their quality of life.

Bryant and Cerfolio (year) observed postoperative patients and found that 67% exhibited a radiographic pneumothorax immediately after the procedure. It is worth noting that just one patient needs a chest tube. This study observed a single occurrence of postoperative pneumothorax in group (B), which was subsequently managed by inserting a chest tube.[17]

In the present investigation, a solitary instance of pneumothorax was seen alone within group (B), which was subsequently managed with the implementation of a chest tube.

One of the primary constraints encountered in this study was the limited sample size of the enrolled participants. Consider conducting a follow-up study that extends beyond six months.

5. *Conclusion*

The findings of our study support the efficacy of Sympathectomy performed at the T3 or T3+T4 levels as a viable long-term therapy option for individuals suffering from palmar and plantar hyperhidrosis. The efficacy of T3 and T4 Sympathectomy in managing pulmonary arterial hypertension (PAH) and pulmonary lymphatic hypertension (PLH) has yielded optimal outcomes. Furthermore, the occurrence of complications between the two groups did not exhibit any statistically significant differences.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

References

1. Ureña A, Ramos R, Masuet C, et al. An assessment of plantar hyperhidrosis after endoscopic thoracic sympathicolysis. Eur J Cardiothorac Surg. 2009;36(2):360-363.
2. Tugnoli V, Eleopra R, De Grandis D. Hyperhidrosis and sympathetic skin response in chronic alcoholic patients. Clin Auton Res. 1999;9(1):17-22.
3. Rieger R, Pedevilla S. Retroperitoneoscopic lumbar sympathectomy for the treatment of plantar hyperhidrosis: technique and preliminary findings. Surg Endosc. 2007;21(1):129-135.
4. Li X, Chen R, Tu YR, et al. Epidemiological survey of primary palmar hyperhidrosis in adolescents. Chin Med J (Engl). 2007;120(24):2215-2217.
5. Sternbach JM, DeCamp MM. Targeting the Sympathetic Chain for Primary Hyperhidrosis: An Evidence-Based Review. Thorac Surg Clin. 2016;26(4):407-420.
6. Lin TS, Kuo SJ, Chou MC. Uniportal endoscopic thoracic sympathectomy for treatment of palmar and axillary hyperhidrosis: analysis of 2000 cases. Neurosurgery. 2002;51(5 Suppl):S84-S87.
7. 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(3):514-519.
8. Huh CH, Han KH, Seo KI, Eun HC. Botulinum toxin treatment for a compensatory hyperhidrosis subsequent to an upper thoracic sympathectomy. J Dermatolog Treat. 2002;13(2):91-93.
9. Wolosker N, Yazbek G, Milanez de Campos JR, Kauffman P, Ishy A, Puech-Leão P. Evaluation of plantar hyperhidrosis in patients undergoing video-assisted thoracoscopic sympathectomy. Clin Auton Res. 2007;17(3):172-176.
10. Hsu CP, Chen CY, Lin CT, Wang JH, Chen CL, Wang PY. Video-assisted thoracoscopic T2 sympathectomy for hyperhidrosis palmaris. J Am Coll Surg. 1994;179(1):59-64.
11. Reisfeld R. Sympathectomy for hyperhidrosis: should we place the clamps at T2-T3 or T3-T4?. Clin Auton Res. 2006;16(6):384-389
12. Malmivaara A, Kuukasjärvi P, Autti-Ramo I, Kovanen N, Mäkelä M. Effectiveness and safety of endoscopic thoracic sympathectomy for excessive sweating and facial blushing: a systematic review. Int J Technol Assess Health Care. 2007;23(1):54-62.
13. oscertales J, Arroyo Tristán A, Congregado Loscertales M, et al. Tratamiento de la hiperhidrosis palmar por simpatectomía torácica. Resultados inmediatos y calidad de vida postoperatoria [Thoracoscopic sympathectomy for palmar hyperhidrosis. Immediate results and postoperative quality of life]. Arch Bronconeumol. 2004;40(2):67-71.
14. Montessi J, Almeida EP, Vieira JP, Abreu Mda M, Souza RL, Montessi OV. Video-assisted thoracic sympathectomy in the treatment of primary hyperhidrosis: a retrospective study of 521 cases comparing different levels of ablation. J Bras Pneumol. 2007;33(3):248-254.
15. Kara M, Kose S, Ozkan B, Sertcakacilar G. Does clip removal help for compensatory hyperhidrosis complicating thoracic sympathetic clipping?. Clin Auton Res. 2019;29(3):353-355.
16. Dias LI, Miranda EC, Toro IF, Mussi RK. Relationship between anxiety, depression and quality of life with the intensity of reflex sweating after thoracoscopic sympathectomy for treatment of primary hyperhidrosis. Rev Col Bras Cir. 2016;43(5):354-359.
17. Bryant AS, Cerfolio RJ. Satisfaction and compensatory hyperhidrosis rates 5 years and longer after video-assisted thoracoscopic sympathotomy for hyperhidrosis. J Thorac Cardiovasc Surg. 2014;147(4):1160-1163.e1.