Quality of life before surgery is a predictive factor for satisfaction among patients undergoing sympathectomy to treat hyperhidrosis

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Purpose: **The objective of this study was to evaluate the postoperative quality of life (QOL) experienced among a group of 1167 patients who underwent video-assisted thoracoscopic sympathectomy (VATS) to treat primary hyperhidrosis, as compared with the presurgical QOL.**

Methods: **Between February 2002 and June 2007, 1167 patients who had undergone VATS were surveyed. The majority had presented with palmar hyperhidrosis (794 patients; 68%), while 340 (29%) had presented with axillary hyperhidrosis. Based on data obtained from the QOL protocol applied to all of the patients preoperatively, the patients were divided into two groups according to the level of their QOL: group 1 consisted of 312 patients (27%) with poor QOL and group 2 of 855 patients (73%) with very poor QOL. The same protocol was applied postoperatively, and five different levels of satisfaction were obtained. The same parameters were evaluated for both the palmar and the axillary hyperhidrosis subgroups.**

Results: **The patients with very poor QOL had much better results in terms of improvement in QOL than did those with poor QOL ($P < .05$). The same result was observed for both the palmar and axillary hyperhidrosis subgroups ($P < .05$).**

Conclusion: **The worse the preoperative QOL among patients undergoing sympathectomy to treat primary hyperhidrosis is, the better the postoperative improvement in QOL will be. (J Vasc Surg 2010;51:1190-4.)**

Hyperhidrosis consists of excessive sweating in limited regions of the body that is often triggered by an emotional situation.[1] Sympathectomy is the treatment of choice, since it is definitive and presents high success rates with low risk.[2]

Knowledge of prognostic factors that might be correlated with greater satisfaction with treatment has been sought in studies in the literature. Many studies have demonstrated improvements in quality of life (QOL) for most patients undergoing surgery to treat hyperhidrosis. However, their QOL may be affected by factors such as compensatory hyperhidrosis and surgical failure.[3,4]

The worsening of the QOL of such individuals is generally due to the effect that hyperhidrosis has on their routine activities.[5] So far, no studies have analyzed the level of QOL prior to surgery as a prognostic factor for these patients' satisfaction with the surgical procedure.

The objective of this study was to evaluate the postoperative QOL experienced by a group of 1167 patients who underwent video-assisted thoracoscopic sympathectomy (VATS) to treat primary hyperhidrosis, as compared with presurgical QOL indices.

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MATERIAL AND METHODS

This was a retrospective study of 1167 patients with palmar (794 patients; 68%) and axillary (340 patients; 29%) hyperhidrosis who underwent VATS between February 2002 and June 2007.

The patients all underwent similar treatment following the same protocol except for the level of ganglion resection, which varied according to the location of the sweating. The treatment was conducted in accordance with the hospital's ethical standards as set out by its Ethics Committee for Analysis of Research Projects on Human Experimentation. Patients with prior thoracic surgery, cardiac diseases, pulmonary infections, neoplasia, or pleural or lung diseases that could increase the surgical risk were not eligible for the operation.

In this sample, 980 patients (84%) had unsuccessfully undergone different forms of clinical treatment at other services. For this reason, sympathectomy was indicated for those who presented poor or very poor QOL. Patients whose QOL was good were not operated on by our group.

The patients underwent their operations under general anesthesia in a semi-seated position at 45°. Two mini-incisions of approximately 5.5 mm each were made: the first into the fourth or fifth intercostal space on the anterior axillary line (in the submammary sulcus for the women), through which a video camera was introduced; and the second into the second intercostal space on the mid-axillary line, through which an electric or harmonic scalpel was

Table I. Resection level used on the patients

Sympathectomy level	*n*	*%*
T2	68	5.82
T2+T3	260	22.28
T3	372	31.89
T3+T4	183	15.68
T4	284	24.33
Total	1167	100

introduced. The level of ganglion resection depended on the location of the sweating. After the sympathetic chain had been identified, it was sectioned (sympathicotomy) on the body of the ribs above and below the selected ganglion, followed by thermoablation of the segment isolated between the ribs. The same procedure was performed on the contralateral chain. No mortality or conversion to open surgery occurred in our series.

The patients' ages were between 8 and 70 years, with a mean of 25.0 ± 7.8 years and a median of 23 years. The group was composed of 790 women and 377 men. The patients' body mass index (BMI) ranged from 13.6 to 32.3, with a mean of 21.6 ± 2.6 and a median of 21.5. Among the 1167 patients, the majority presented palmar hyperhidrosis (794 patients; 68%), while 340 (29%) presented axillary hyperhidrosis. The resection level used on these patients is described in Table I.

The QOL protocol described by Amir et al[6] and adapted for the English language by De Campos et al[5] was applied to all patients one week before the surgery. This protocol investigated situations of daily life in which hyperhidrosis might interfere. The initial QOL was classified as five different satisfaction levels, which were obtained as the summed total scores from the protocol (ranging from 20 to 100). When the total was greater than 84, the QOL was considered very poor; from 69 to 84, poor; from 52 to 68, good; from 36 to 51, very good; and from 20 to 35, excellent.

Based on the data obtained from the preoperative QOL protocol, the patients were divided into two groups according to the level of their QOL: group 1 consisted of 312 patients with poor QOL, and group 2 consisted of 855 patients with very poor QOL. None of the patients who presented any of the other three QOL levels at the preoperative assessment underwent the operation.

There were no serious intraoperative complications. Pleural drainage was necessary in 37 cases because of pneumothorax, and all drains were removed within 48 hours. All the patients presented some degree of postoperative pain, which was treated with analgesics and anti-inflammatory agents. In no case did the pain persist for more than two months. We had 12 cases of Horner's syndrome, which was often associated with heat transmission when the lung apex was freed from adherent tissue. There were only four cases in which complete regression of this condition did not occur. Therapeutic failure occurred in 17 cases.

The incidence and severity of compensatory hyperhidrosis in the two groups after sympathectomy is presented in Table II.

All the patients in this sample presented some degree of postoperative compensatory hyperhidrosis, and its severity was similar in the two groups ($P = .639$). For the purposes of this study, all the patients underwent an assessment one month after the surgery.

The postoperative QOL protocol[6] was again applied to all patients one month after the surgery. This again investigated situations of daily life in which hyperhidrosis might interfere. The final QOL was classified as five different satisfaction levels, which were obtained as the summed total scores from the protocol (ranging from 20 to 100). From this, the patients' postoperative evolution was classified as follows: when the total was greater than 84, the QOL was considered much worse; from 69 to 84, a little worse; from 52 to 68, the same; from 36 to 51, a little better; and from 20 to 35, much better.[5]

The postsurgical QOL indices of the two groups of patients (those whose QOL was poor and very poor before the surgery) were compared. The evaluation was also made between two subgroups: patients with palmar hyperhidrosis (794 patients) and patients with axillary hyperhidrosis (340 patients). The chi-square and general Fisher's exact statistical tests were used. The significance level (P value) was taken to be .05.

RESULTS

The comparison of the two groups (those whose QOL was poor and very poor before the surgery) regarding the postsurgical QOL indices is presented in Table III.

We observed that the patients who had presented very poor QOL before the operation had a result that was much better than that of the patients with poor QOL. Patients with very poor QOL more frequently gave the response "much better" after the surgery. Regarding the response "a little better," the odds ratio (OR) was 2.1.

The QOL results after the operation for the patients with palmar hyperhidrosis alone compared with the situation before the operation are presented in Table IV.

The patients with very poor QOL presented results that were much better than those of the patients with poor QOL ($P < .05$). Patients with very poor QOL more frequently gave the response "much better" after the surgery. Regarding the response "a little better," the OR was 1.8.

The QOL results after the operation for the patients with axillary hyperhidrosis alone compared with the situation before the operation are presented in Table V.

The patients with very poor QOL presented results that were much better than those of the patients with poor QOL ($P < .05$). Patients with very poor QOL more frequently gave the response "much better" after the surgery. Regarding the response "a little better," the OR was 2.2.

DISCUSSION

Because of the excellent results from sympathectomy for treating patients with hyperhidrosis that have been

Table II. Incidence and severity of compensatory hyperhidrosis in relation to quality of life before the surgery

	Quality of life before the surgery			
	Poor	*Very poor*	*Total*	P *value*
Compensatory hyperhidrosis, No. (%)				
Absent	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Present	296 (100%)	798 (100%)	1094 (100%)	
Severity, No. (%)				
Mild	87 (29.4%)	224 (28.1%)	311 (28.4%)	
Moderate	129 (43.6%)	335 (42.0%)	464 (42.4%)	.639
Severe	80 (27.0%)	239 (29.9%)	319 (29.2%)	
Total number of patients	296	798	1094	

P, Chi-square test.

Table III. Quality of life before and after the operation for all patients

	Before the surgery			
	Poor	*Very poor*	*Total*	*Valor* P *value*
30 days after the surgery				
Much better	211 (67.6%)	715 (83.6%)	926 (79.3%)	
A little better	70 (22.4%)	111 (13.0%)	181 (15.5%)	
The same	18 (5.8%)	23 (2.7%)	41 (3.5%)	.001
A little worse	10 (3.2%)	5 (0.6%)	15 (1.3%)	
Much worse	3 (1.0%)	1 (0.1%)	4 (0.3%)	
Total number of patients	312	855	1167	

P, Generalized Fisher's exact test.

Table IV. Quality of life before and after the operation for the patients with palmar hyperhidrosis

	Before the surgery			P
	Poor	*Very poor*	*Total*	*value*
30 days after the surgery				
Much better	140 (70.7%)	500 (83.9%)	640 (80.6%)	
A little better	38 (19.2%)	76 (12.8%)	114 (14.4%)	
The same	11 (5.6%)	17 (2.9%)	28 (3.5%)	.0001
A little worse	7 (3.5%)	2 (0.3%)	9 (1.1%)	
Much worse	2 (1.0%)	1 (0.2%)	3 (0.4%)	
Total number of patients	198	596	794	

P, Generalized Fisher's exact test.

Table V. Quality of life before and after the operation for the patients with axillary hyperhidrosis

	Before the surgery			P
	Poor	*Very poor*	*Total*	*value*
30 days after the surgery				
Much better	65 (65.7%)	198 (82.2%)	293 (77.4%)	
A little better	25 (25.3%)	34 (14.1%)	59 (17.4%)	
The same	6 (6.1%)	6 (2.5%)	12 (3.5%)	.015
A little worse	2 (2.0%)	3 (1.2%)	5 (1.5%)	
Much worse	1 (1.0%)	0 (0.0%)	1 (0.3%)	
Total number of patients	99	241	340	

P, Generalized Fisher's exact test.

observed in most studies in the literature and the widespread publicity for this procedure in the communications media, the demand for this type of surgery has increased worldwide.[7,8] In our setting, because the hospital is a referral institution, our outpatient clinic has been receiving large numbers of patients since its inauguration in 1999. This has consequently generated a large quantity of operations accomplished, as can be seen from our sample population.

Since the beginning of our activities in 2002, we have used an attendance protocol for all patients. This protocol has to be filled out with all of the patient's preoperative data, any surgical complications, QOL data before and after the operation, and the surgical results. This has allowed us to carry out the present study adequately, with minimal data loss, despite the retrospective nature of this study. Retrospective studies would normally underestimate various aspects of the cases evaluated.

Most of the 980 patients operated on (84%) had sought our service after already unsuccessfully undergoing some type of clinical treatment. Unfortunately, there is still no proven type of clinical treatment for palmar or axillary hyperhidrosis.

Comparing our patients with palmar versus axillary hyperhidrosis, there was no difference between them in terms of age, BMI, gender, resection level, or postoperative compensatory hyperhidrosis, and thus the two groups of patients were homogenous.

Most of the patients undergoing surgery were young adults, since the symptoms most frequently start during childhood.[9] Although there are no studies in the literature correlating gender with the incidence of hyperhidrosis, we observed that the patients undergoing surgery were predominantly female.[8,10] This is probably because excessive sweating has greater repercussions on women's day-to-day lives.

From a neuroanatomical point of view, sympathectomy that aims to denervate the upper limb in the way in which it is done (sectioning of the sympathetic chain above the ribs, between the target sympathetic ganglia) causes interruption of the preganglionic fibers coming from the second neuron of the sympathetic motor route, located in the spinal cord below the fourth thoracic segment.

The surgical technique used by our group is well standardized. It varies only in the level of ganglion resection according to the location of the hyperhidrosis symptoms. The variation in resection levels used over the course of time denotes changes of approach that were implemented over the study period. At the start of the study period (2002), palmar hyperhidrosis was treated by means of sympathectomy at the T2 and T3 ganglion levels. With evolution of the therapy,[2,11] we began to recommend the use of sympathectomy limited to a single ganglion to diminish the incidence of compensatory hyperhidrosis. Currently, we are performing T2 sympathectomy for craniofacial hyperhidrosis and T4 sympathectomy both for palmar and for axillary hyperhidrosis.[12-14]

After we have performed sympathectomy, a minority of the patients may present recurrence of the symptoms. Such cases are often due to technical failure and are manifested at an early stage. Before denervation at the T4 level, it needs to be made clear to patients that the expected effect is an improvement in palmar hyperhidrosis and not complete palmar anhydrosis. Patients' hands will continue to have slight dampness, close to what is expected among individuals without hyperhidrosis. Auxiliary methods such as skin temperature measurement may possibly help the surgical team to produce even better results.[15]

Although some ganglion resection techniques that were used during the study period are currently not in use by our team, they were used uniformly in both groups (poor and very poor), and they continue to be used by other surgical teams.[16,17]

From our experience, all patients who have undergone such operations present some degree of compensatory hyperhidrosis. However, severe compensatory hyperhidrosis only occurred in 29.2% of the 340 cases.

Generic methods for QOL evaluation, such as the SF-36, assess individuals' general health but do not detect changes in specific QOL regarding given diseases.[18] The QOL protocol that we used has been validated and used in several published studies. It has been shown to be specific regarding evaluating how the symptoms of hyperhidrosis interfere with different situations within day-to-day life and with patients' overall QOL.[5,6,19]

The degree to which hyperhidrosis worsens a patient's QOL depends not only on the severity of the hyperhidrosis but also on the patient's adaptation to the situation.[20] Some individuals with hyperhidrosis that is not so severe present very poor QOL, whereas at the other extreme, other patients with very severe hyperhidrosis may report that their QOL is not so poor, because they have adapted better to their situation. Among our sample, only the patients with poor or very poor QOL indices underwent the operation.

Postoperatively, if there is no technical failure, there is a substantial improvement in a patient's day-to-day life, as shown by these individuals' satisfaction and the improvement in their QOL.[21]

The only prognostic factors currently associated with worsening of QOL following thoracic sympathectomy to treat hyperhidrosis are surgical failure and severe compensatory hyperhidrosis.[22,23] In our attempt to find a new prognostic factor, we observed that the best postoperative QOL levels (much better) were among the patients who were in the worst condition before the operation (very poor).

CONCLUSION

The worse the preoperative QOL among patients undergoing sympathectomy to treat primary hyperhidrosis is, the better the postoperative QOL will be.

AUTHOR CONTRIBUTIONS

Conception and design: NW, GY, JC, MM, PK, PL
Analysis and interpretation: NW, GY, PL
Data collection: NW, GY, JC, MM, PK
Writing the article: NW, GY
Critical revision of the article: NW, GY, JC, MM, PK, FJ
Final approval of the article: NW, GY, JC, MM, PK, FJ, PL
Statistical analysis: N/A
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Overall responsibility: NW, GY, JC, MM, PK, FJ, PL

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