

# Patient Satisfaction after Endoscopic Thoracic Sympathectomy for Palmar Hyperhidrosis

Hiroshige Nakamura, Tomohiro Haruki, Yoshin Adachi, Shinji Fujioka, Ken Miwa and Yuji Taniguchi

*Division of General Thoracic Surgery, Tottori University Hospital, Yonago 683-8504 Japan*

Endoscopic thoracic sympathectomy (ETS) for palmar hyperhidrosis was performed using a 3-mm small endoscope at our hospital, and we conducted a questionnaire for the purpose of studying the conditions and satisfaction after surgery. The subjects were comprised of 50 patients, of which 35 patients (75%) answered the survey. The average age of the respondents was 27 years old (range: 12–62 years old) including 13 males and 22 females and the average postoperative observation period was 33 months (1–114 months). The results showed the good effects of surgery in all of the patients for palmar sweating while patient satisfaction was 79.4 points, which concluded that ETS was sufficiently accepted as treatment for palmar hyperhidrosis. However, compensatory sweating (CS) developed in 97.1% of the patients, and 82.9% answered that they were disturbed because it was more than they had expected. This result makes us realize further the importance of preoperative informed consent for CS. The problem of palmar hyperhidrosis is very serious for patients, and hence it is important to give treatment with a thorough understanding of the effectiveness and problems of ETS for palmar hyperhidrosis according to the analytical results of this questionnaire.

**Key words:** compensatory sweating; endoscopic thoracic sympathectomy; palmar hyperhidrosis; patient satisfaction

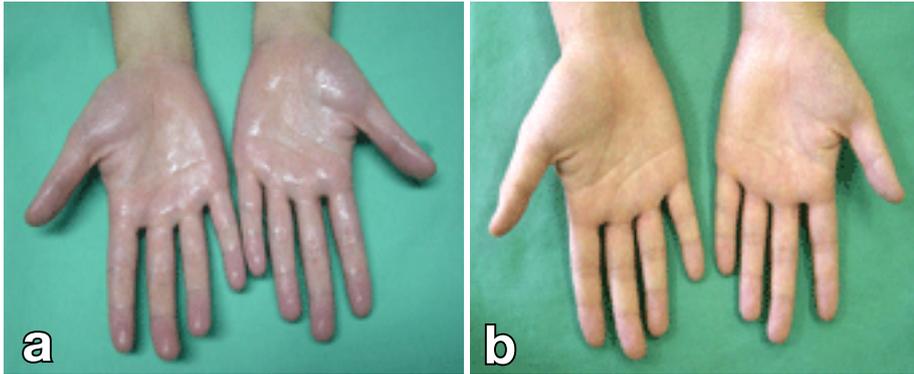
Palmar hyperhidrosis is a disorder of unknown cause with excessive sweating on the palms and tends to increase with the recent upsurge of stress in society as a background. It mostly develops in later childhood, and because emotional distress is great, some people become introverted after having this problem for many years. We have successfully performed endoscopic thoracic sympathectomies (ETS) for the present disorder using a 3-mm small endoscope, and afterwards, conducted a questionnaire for the purpose of studying long-term sweating conditions and satisfaction after surgery in patients with palmar hyperhidrosis who underwent surgery at our hospital.

## Subjects and Methods

A questionnaire was given by mail as a response system for 50 patients with palmar hyperhidrosis who had ETS at Tottori University Hospital from August 1998 to December 2007. Before ETS, we explained the operative indications, procedures, complications and adverse effects including compensatory sweating (CS) to the patients as informed consent. Especially regarding CS, we noticed that it would occur in all the patients to a greater or lesser degree. For surgery, ETS at the 2nd and 3rd levels (T2 and T3 sympathectomy)

---

Abbreviations: CS, compensatory sweating; ETS, endoscopic thoracic sympathectomy



**Fig. 1.** Comparison of the preoperative and postoperative conditions of the palms of a patient with palmar hyperhidrosis. **a:** Before endoscopic thoracic sympathectomy (ETS). **b:** After ETS.

was performed under general anesthesia using a small 3-mm endoscope. After dissection of the mediastinal pleura, the thoracic sympathetic trunk was cut and coagulated with end-scissors or electro-cauterized on the second and third rib. Palmar sweating stopped in all of the patients immediately after the surgery (Fig. 1). For the questionnaire, the current sweating condition, CS,

daily life, anxiety over the surgery for palmar hyperhidrosis and postoperative patient satisfaction were studied. Answers were obtained from 35 patients (75%). The average age of the respondents was 27 years old (12–62 years old). There were 13 males and 22 females and the average postoperative observation period was 33 months (1–114 months). There were no complications in the all patients during the peri-operative period.



**Fig. 2.** Current conditions of sweating.

• Are there any new areas where you experience sweating (CS)? (**yes: 34; no: 1**)

→ **For those who answered “yes”**

• How much are you sweating (CS) compared to your expectations?



**Fig. 3.** Compensatory sweating (CS).

## Results

### Current sweating conditions

The amount of palmar sweating completely stopped in 29 patients (82.9%) but still occurred slightly in 6 patients (17.1%), which showed the positive effective of this surgery for all of the patients (Fig. 2). Facial and cervical sweating decreased in 25 patients (71.4%), but for sweating in the axilla and the sole of the foot, no change was observed in 12 patients (34.3%) and 17 patients (48.6%), respectively. These were the highest numbers recorded.

### CS

CS occurred in 34 patients (97.1%), and 29 patients (82.9%) answered they were disturbed because it was more than they expected, and this number of patients was considered to be quite high (Fig. 3). The sites for sweating included the

back, abdomen, thighs and buttocks, and most of the patients answered that it occurred more after exercising and in summer. For the question of whether they took some countermeasures against sweat, the answers included changing clothes and underwear often, placing a towel between the skin and underwear, not wearing a T-shirt that is easily seen through, using deodorant spray, wrapping a towel around the lower back, trying not to sweat, wiping off the skin often, cooling the body using a refrigerant, etc.

### Current daily life

Most of the patients answered that there were no feelings of inconvenience in their daily lives after the surgery compared with preoperative conditions. Twenty-one patients (60%) answered that they had psychologically become positive, which was considered a high number (Fig. 4). As for the operated areas after surgery, most patients answered that they had no pain and were not overly disturbed or bothered by it.

• Are there any mental changes before and after the surgery?

A	Became negative	3
B	Became slightly negative	2
C	Unchanged	9
D	Became slightly positive	10
E	<b>Became positive</b>	<b>11</b>

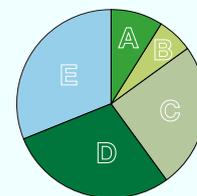


Fig. 4. Daily life.

• Were you anxious about the surgery?

A	Very anxious	2
B	Slightly anxious	13
C	No opinion	1
D	<b>Not very anxious</b>	<b>15</b>
E	Not anxious at all	4

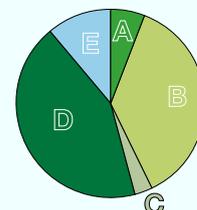


Fig. 5. Anxieties over the surgery for palmar hyperhidrosis.

• Rate your level of satisfaction with the surgery on a scale of 10 to 100.

**Average: 79.4 points (scale of 10–100)**

• If you were consulted by someone who has a similar degree of palmar sweating, how would you describe this surgery?

A	I would recommend the surgery	13
B	<b>I would discuss the surgery</b>	<b>16</b>
C	No opinion	4
D	I would rather not talk about the surgery	1
E	I would not talk about the surgery	1

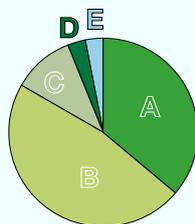


Fig. 6. Overall assessment of the surgery for palmar hyperhidrosis.

### Surgery for hyperhidrosis

Nineteen patients (54.3%) answered that they hardly felt anxious about the surgery, which was a rather high rate, but 15 patients (42.9%) reported some degree of anxiety (Fig. 5). Regarding the side effects except for CS, 11 patients (31.4%) answered that they experienced some type of side effects, including dry hands, a cold sense in the hands, hypesthesia, etc., and most of them had indefinite complaints.

### Postoperative satisfaction

The assessment of the satisfaction of the surgery on a 100-point scale was 79.4 points (10–100 points) on average. For the question that asked whether they would like to tell other patients with palmar hyperhidrosis about the present surgical method, 13 patients answered that they would like to recommend it, and 16 patients said would like to tell them about it, a total of 29 patients (82.9%) for both. Thus, it was clear that many of the patients wished that some sort of information about treatment with surgery would be provided (Fig. 6).

## Discussion

With the widespread use of thoracoscopy, ETS for palmar hyperhidrosis has developed quite dramatically (Kux, 1978; Chen et al., 1994; Okabayashi et al., 1999). However, the largest problem continues to be CS which occurs as an adverse effect and many patients gradually experience this problem after they return to their daily lives. Therefore, in order to find out the true satisfaction level of patients who had ETS, it is important to study the degree of sweating after at least one month after hospital discharge (Andrews and Rennie, 1997). In this study, the efficacy of ETS and the degree of CS were studied by surveying the long-term patient satisfaction using a questionnaire after surgery.

The average postoperative observation period was 33 months, and as for the amount of palmar sweating, it completely stopped in 82.9% of the patients and occurred slightly in 17.1%, thus showing the positive effects of ETS in all of the patients. The average rate for patient satisfaction was 79.4 out of 100 points, and 82.9% of the patients wished to be provided with some sort of information about ETS for people who had the same problems with palmar hyperhidrosis. It is believed that these results show that ETS is sufficiently accepted as a treatment for palmar hyperhidrosis. On the other hand, 7 out of 35 patients (20%) gave a satisfaction level of 50 points or less, and CS which was more than they expected was observed in all 7 of these patients. Among them, 1 patient who reported a satisfaction score of 10 points had severe CS and answered that it was good that palmar sweating stopped but CS became a new problem and this patient thus regretted having undergone the surgery. Hirakawa et al. (2004) reported the frequency of CS to range from 7% to 98.6% according to numerous reports, but it is believed that this disparity results from differences in the definition of CS, and it essentially develops in all patients to a greater or lesser degree and most frequently occurs on the

back, chest, abdomen, and thigh. In this survey, CS also developed in 97.1% of the patients, and 82.9% of the patients answered that they were disturbed because it was more than they had expected before the surgery. According to an analysis of a questionnaire in 40 patients by Libson et al. (2007), 6 patients (15%) answered that they regretted having surgery for CS seriously affecting their quality of life, therefore surgeons should be careful when selecting patients to undergo this treatment. We also came to realize the importance of preoperative explanations in regard to CS, and it will be necessary to improve this point in the future. Regarding methods to minimize CS, Schmidt et al. (2006) and Kwong et al. (2008) reported that blocking at the level of Th2 enhanced CS according to analyses of the blocking sites of thoracic sympathetic nerves, and Jaffer et al. (2007) also described that CS frequently developed by blocking at the level of Th2 for facial hyperhidrosis and erythromania. Moreover, Licht and Pilegaard (2004) reported that CS developed to a large degree in axillary hyperhidrosis with a large blocked area from the levels of Th2 to 4. Therefore, for non-severe palmar hyperhidrosis, blocking only Th3 and avoiding blocking Th2 can be taken into consideration. Moreover, Lin et al. (1998) and Chou et al. (2006) recommend a reversible clipping method as a blocking method. However, Miller and Force (2008) considered the effect of the clipping method to be uncertain, as there is also a possibility of recurrence, while CS is irreversible even with clipping, and he goes on to describe that it is safer to carefully perform a sympathectomy after determining whether CS is significant by temporarily performing a sympathetic nerve block before surgery. Regarding the above problems, the findings and recommendations remain controversial. There is also a report that CS is an allowable adverse effect and it is desirable to have surgery at an early stage by adulthood (Steiner et al., 2007). Thus, the relationship between ETS and CS has not yet been elucidated. Under these circumstances, a report by Fujita et al. (2002) that perioperative temperature or blood

flow differences in finger tips correlates with CS and a report by Bonde et al. (2008) on the objective assessment of the amounts of sweating while applying sweat stimulation with a method called ventilated capsule technique are very interesting findings. It is believed that assessing the degree of CS as well as accurately estimating it preoperatively and then utilize that data for selecting optimal treatment protocol remains an important study for the future.

In general, it has been reported that a patient who demonstrates more sweating from heat than from mental strain tends to demonstrate more CS regardless of the operative method (Hirakawa et al., 2004). Meticulous attention is therefore needed for a patient who tends to “naturally sweat a lot over the entire body.” Okabayashi et al. (2004) cited a guideline with 10 items as key points for the preoperative explanation and described that it was particularly important to thoroughly explain the occurrence of CS and the irreversibility of the present surgery. We are now planning to make use of the knowledge we obtained according to the results [especially the patient satisfaction score of 79.4 points, CS development of 97.1% and that 29 patients (82.9%) answered they were disturbed because it was more than they expected] of this questionnaire about appropriate countermeasures that patients can take against CS in the future, as well as providing a sufficient explanation about CS for patients with palmar hyperhidrosis and also obtaining informed consent before performing any surgical procedures.

Palmar hyperhidrosis appears to be increasing in modern society due to the recent upsurge in stress. It is a disorder strongly affected by familial factors, but there is still no definitive treatment for it, and treatment should therefore be selected according to the patients wishes and desires as a rule. It is believed that there are many potential patients with palmar hyperhidrosis, and the problem is serious, particularly for junior high school, high school and university students, but the analytical results of the this questionnaire showed that the problem of postoperative CS was

more serious than has been previously thought. Therefore, many believe that treatment needs to be carefully selected after achieving a better understanding of the effectiveness and problems associated with ETS for palmar hyperhidrosis.

*Acknowledgments:* This research was supported by a Grant on Tottori-Prefecture Region-Specific Diseases from Tottori Prefecture, Japan.

## References

- 1 Andrews BT, Rennie JA. Predicting changes in the distribution of sweating following thoracic sympathectomy. *Br J Surg* 1997;84:1702–1704.
- 2 Bonde P, Nwaejike N, Fullerton C, Allen J, Mcguigan J. An Objective assessment of the sudomotor response after thoracoscopic sympathectomy. *J Thoracic Cardiovasc Surg* 2008;135:635–641.
- 3 Chen HJ, Shih DY, Fung ST. Transthoracic endoscopic sympathectomy in the treatment of palmar hyperhidrosis. *Arch Surg* 1994;129:630–634.
- 4 Chou S, Kao E, Lin C, Chang Y, Huang M. The importance of classification in sympathetic surgery and a proposed mechanism for compensatory hyperhidrosis: experience with 464 cases. *Surg Endosc* 2006;20:1749–1753.
- 5 Fujita T, Mano M, Kawasaki K, Ohmura Y, Nishi H. A clinical study of the relationship between compensatory sweating and palmar skin temperature and palmar skin blood flow in endoscopic thoracic sympathectomy. *Nippon Kyobu Geka Gakkai Zasshi* 2003;17:83–86 (in Japanese with English abstract).
- 6 Hirakawa N, Ogawa I, Totoki T. Prevention and measures for complications with endoscopic thoracic sympathectomy. *Nippon Naishikyo Geka Gakkai Zasshi* 2004;9:63–67 (in Japanese with English abstract).
- 7 Jaffer U, Weedon K, Cameron AE. Factors affecting outcome following endoscopic thoracic sympathectomy. *Br J Surg* 2007;94:1108–1112.
- 8 Kux M. Thoracic endoscopic sympathectomy in palmar and axillary hyperhidrosis. *Arch Surg* 1978;113:264–266.
- 9 Kwong K, Hobbs J, Cooper L, Burrows W, Gamliel Z, Krasna MJ. Satisfied analysis of clinical outcomes in thoracoscopic sympathectomy for hyperhidrosis. *Ann Thorac Surg* 2008;85:390–394.
- 10 Libson S, Kirshtein B, Mizrahi S, Lantsberg L. Evaluation of compensatory sweating after bilateral thoracoscopic sympathectomy for palmer hyperhidrosis. *Surg Laparosc Endosc Percutan Tech*

- 2007;17:511–513.
- 11 Licht PB, Pilegaard HK. Severity of compensatory sweating after thoracoscopic sympathectomy. *Ann Thorac Surg* 2004;78:427–31.
  - 12 Lin CC, Mo LR, Lee LS, NG SM, Hwang MH. Thoracoscopic T2-sympathetic block by clipping a better and reversible operation for treatment of hyperhidrosis palmaris: experience with 326 cases. *Er J Surg Suppl* 1998;580:13–16.
  - 13 Miller D, Force S. Temporary thoracoscopic sympathetic block for hyperhidrosis. *Ann Thorac Surg* 2008;85:1211–1216.
  - 14 Okabayashi K, Maekawa S, Hamatake D, Yamazaki K, Shirakusa T. History, indication and essential anatomy for thoracic sympathetic Surgery. *Nippon Naishikyo Geka Gakkai Zasshi* 2004;9:39–44 (in Japanese with English abstract).
  - 15 Okabayashi K, Makimoto Y, Konno T, Ichiguchi O, Matsuzoe D, Yoshinaga Y, et al. Thoracoscopic sympathectomy for palmar hyperhidrosis. *Nippon Kyobu Geka Gakkai Zasshi* 1999;13:811–817 (in Japanese with English abstract).
  - 16 Schmidt J, Bechara FG, Altmeyer P, Zirngibl H. Endoscopic Thoracic sympathectomy for severe hyperhidrosis: impact of restrictive denervation on compensatory sweating. *Ann Thorac Surg* 2006;81:1048–1055.
  - 17 Steiner Z, Kleiner O, Hershkovitz Y, Mogilner J, Chen Z. Compensatory sweating after thoracoscopic sympathectomy: an acceptable trade-off. *J Pediatric Surg* 2007;42:1238–1242.

*Received May 14, 2008; accepted July 22, 2008*

*Corresponding author: Hiroshige Nakamura, MD*