Minimizing Endoscopic Thoracic Sympathectomy for Primary Palmar Hyperhidrosis: Guided by Palmar Skin Temperature and Laser Doppler Blood Flow

Xu Li, MD, PhD, Yuan-Rong Tu, MD, Min Lin, MD, Fan-Cai Lai, MD, Jian-Feng Chen, MD, and Hui-Weng Miao, MD

Department of Thoracic Surgery, First Affiliated Hospital, Fujian Medical University, Fuzhou City, People's Republic of China

Background. **Limiting the extent of sympathectomy in palmar hyperhidrosis was recently recognized as an effective method to minimize the incidence and severity of troublesome compensatory sweating. However, the levels at which transection should be performed remain controversial. In this study, we proposed that the level of ablation varies and should be adjusted for each individual patient. Guided by palmar skin temperature and laser Doppler blood flow, we try to find the correct target level in each case.**

Methods. **Fifty patients with severe primary palmar hyperhidrosis received bilateral endoscopic thoracic sympathectomy. Different levels of transection from T4 to T2 were performed step by step until the successful extirpation was implied by the intraoperative monitoring. The results of the operations were studied. All patients were followed up and evaluated for symptom resolution, postoperative complication, levels of satisfaction, and severity of compensatory sweating.**

Results. **Of a total of 100 lateral procedures, 76 laterals (76%) ended the procedure at the T4 level, 23 laterals (23%) ended the procedure at the T3 level, and 1 lateral (1%) ended the procedure at the T2 level. The postoperative complication was minor, and no Horner's syndrome was detected. The rate of symptom resolution was 100% and no recurrence was found. The satisfaction rate was 92%, and the incidence of mild, moderate, and severe compensatory sweating were 12%, 8%, and 6%, respectively.**

Conclusions. **Concerning the sympathectomy for palmar hyperhidrosis, there is a possibility that the level of the transection varies and should be adjusted for each individual patient. Intraoperative monitoring of temperature and blood flow may be a useful tool in establishing a kind of standardized reference for finding the correct target level.**

(Ann Thorac Surg 2009;87:427–31)

Endoscopic thoracic sympathectomy is currently the most acceptable surgical treatment for disabling palmar hyperhidrosis. Surgeons all over the world have reported large numbers of operations for treating palmar hyperhidrosis. Although patients with palmar hyperhidrosis can significantly benefit from this surgical procedure, compensatory sweating remains as the most troublesome complication of endoscopic thoracic sympathectomy. According to various traditional sympathectomies or ganglionectomies, severe compensatory sweating may occur in 10% to 40% of postoperative patients [1]. Thus, the prevention or control of compensatory sweating becomes an important aim in the treatment of palmar hyperhidrosis. Recently, more and more studies [2–5] have indicated that limiting the extent of the sympathectomy will decrease the incidence and severity of compensatory sweating. It appears that a T3 or T4 sympathectomy may be the most effective operations for palmar hyperhidrosis, which suggests that lower level sympathectomy may decrease the severity of compensatory sweating. The flip side of the coin, however, is that these lower level sympathectomies may be less definitively effective than that at the T2 level for palmar hyperhidrosis. Logically, in a nonhomogeneous patient population, the level of sympathectomy for each individual patient is not always the same. The aim of this study is to achieve different correct target levels of sympathectomy in individual patients guided by palmar skin temperature and laser Doppler blood flow.

Patients and Methods

Patients

From July 2006 to February 2007, 50 patients were treated at our institution for severe primary palmar hyperhidrosis. All patients received a detailed consultation to evaluate personal, professional, and social handicaps related to palmar hyperhidrosis. A preoperative chest computed tomography scan was performed to exclude lung or pleural disorder. During this consultation, information

Accepted for publication Oct 8, 2008.

Address correspondence to Dr Li, General Thoracic Surgery Department, First Affiliated Hospital, Fujian Medical University, Fuzhou City, 350005, People's Republic of China; e-mail: lixu1967@hotmail.com.

0003-4975/09/$36.00
doi:10.1016/j.athoracsur.2008.10.009

about results and side effects of the procedure was given. All patients were assessed for the degree of symptoms [6] and distribution of excessive sweating. Additionally, a detailed medical history including demographic data and clinical status was documented as well. Informed consent was obtained in writing at least 1 day before surgery through the surgeon after careful explanation of the procedure and goals of the study. The study proposal was submitted to the local university ethics commission, which granted its approval.

Surgical Procedure

The bilateral sympathectomy in one stage was performed for all patients. The procedure was performed under general anesthesia using a single-lumen endotracheal tube. The patient was placed on the operating table in a semisitting position with arms in abduction. After temporarily disconnecting the tracheal tube, the thoracoscope (5 mm 0°; Karl Storz GmbH & Co KG, Tuttlingen, Germany) was introduced through a 5.5-mm port in the fifth intercostal space behind the border of the pectoralis major muscle. A second 5-mm port was introduced in the third intercostal space on the anterior axillary line. The sympathetic chain was identified at the level of the crossing of the fourth, third, and second costal heads. The parietal pleura was opened. First, the sympathetic chain crossing the T4 costal head was simply transected by diathermy. If intraoperative monitoring indicated that the variables increased significantly and reached the threshold, no further transection was performed. Otherwise, the T3 level was transected, and so on, until the T2 level was transected. The diathermy incision was routinely extended laterally for approximately 3 cm on the corresponding costa to include any accessory nerve fibers (the nerve of Kuntz). All procedures were completed by insertion of a 16F chest tube through a trocar, and the lung was reinflated under visual control. The chest tube was aspirated while the anesthesiologist ventilated the patient manually, exerting continuous positive pressure for a few seconds, to prevent pneumothorax before the drain was subsequently removed.

Intraoperative Monitoring

A palmar temperature probe (Skin Temperature Probe TT05A; TGC Instrument Company, Shanghai, China) and Doppler blood flow probe (Periflux 5010; Perimed Company, Stockholm, Sweden) were placed on the thenar eminence and taped in place. Before operation, palmar temperature was kept less than 30°C by immersing the hand in water at 4°C. Before skin incision, baseline palmar temperature and blood flow were recorded. Then the transection of the sympathetic chain at T4 level was performed. If the monitoring indicated both a 30% increase in blood flow and a 1.5°C increase in temperature, it implies that extirpation was achieved. If either variable did not reach the threshold within 5 minutes, the further T3 level transection was performed, and so on, until the T2 level was transected.

Table 1. Patient Characteristics

Characteristic	Result
Age, years (range)	21.6 ± 2.4 (16–41)
Sex, M/F	22:28
Positive family history, n (%)	15 (30)
Distribution of hyperhidrosis, n (%)	
Palmar only	17 (34)
Palmar + plantar	12 (24)
Palmar + axillary	6 (12)
Palmar + plantar + axillary	15 (30)

Table 2. Operative Detail

Variable	Result
Level of sympathectomy, n (%)	
T4 only	76 (76%)
T4 + T3	23 (23%)
T4 + T3 + T2	1 (1%)
Mean operating time, min (range)	25 (20–36)
Mean rise of palmar temperature, (range)	2.9 (1.9–4.5)
Mean increase of blood flow, % (range)	156 (78–206)
Intraoperative complication (n)	
Bleeding	2
Complication immediately postoperatively (n)	
Pneumothorax	3
Prolonged chest drainage	1

Follow-Up and Data Collection

All study patients were scheduled for follow-up either by visits or through the mail at 1 and 12 months after operation. Patients were required to fill out a detailed questionnaire [2]. The data collected include resolution of symptoms, postoperative complications, the severity of compensatory sweating, levels of satisfaction with procedure, and incidence of symptom recurrence.

Results

The study group consisted of 50 patients, with 100 lateral endoscopic thoracic sympathectomy procedures per-

Table 3. Postoperative Follow-Up

Variable	Result
Immediate postoperative resolution of palmar symptom, n (%)	50 (100)
Patients with resolution of symptom, n (%)	
Palmar	50 (100)
Plantar	13 (48)
Axillary	13 (62)
Recurrence, n (%)	0 (0)
Satisfaction, n (%)	
Very satisfied	40 (80)
Satisfied	6 (12)
Dissatisfied	3 (6)
Very dissatisfied	1 (2)