

## Endoscopic transthoracic sympathectomy: An efficient and safe method for the treatment of hyperhidrosis

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**Background:** Hyperhidrosis of the palms, axillae, and face has a strong negative impact on the quality of life for many persons. Existing nonsurgical therapeutic options are far from ideal. Definitive cure can be obtained by upper thoracic sympathectomy. The traditional open surgical technique is a major procedure; few patients and doctors have found that risk-benefit considerations favor surgery. Endoscopic minimal invasive surgical techniques are now available.

**Objective:** We investigated whether endoscopic ablation of the upper thoracic sympathetic chain is efficient and safe in the treatment of hyperhidrosis.

**Methods:** We treated 850 patients with bilateral endoscopic transthoracic sympathectomy.

**Results:** There was no mortality or life-threatening complication. Nine patients (1%) required intercostal drainage because of hemothorax or pneumothorax. Treatment failure occurred in 18 cases (2%) and symptoms recurred in 17 patients (2%). At the end of follow-up (median, 31 months) 98% of the patients reported satisfactory results.

**Conclusion:** Endoscopic transthoracic sympathectomy is an efficient, safe, and minimally invasive surgical method for the treatment of palmar, axillary, and facial hyperhidrosis. (J AM ACAD DERMATOL 1995;33:78-81.)

Idiopathic hyperhidrosis is often localized to the palms, soles, axillae, and face. This excessive sweating is elicited by emotional factors, but the patients are not unduly neurotic.<sup>1</sup> Hyperhidrosis may, however, produce secondary negative emotional, professional, and social consequences. The prevalence of hyperhidrosis is 0.6% to 1.0%<sup>2</sup> in young adults.

Treatment methods can be divided into those which directly affect the sweat glands and those which modify the innervation of the glands.<sup>3,4</sup> Bio-feedback and pharmacologic treatment may modify the innervation of the sweat glands.<sup>4,5</sup> None of these "conservative treatments" can offer permanent cure. Surgical excision of sweat glands is possible only in the axillae, where it may cause disfiguring scars.<sup>6</sup> Since 1920 sympathectomy has been a reliable method to abolish sweating.<sup>7</sup> The techniques of open surgical access to the upper thoracic sympathetic

chain are multiple, but they all share the drawbacks of being major surgical procedures with considerable risk of complications and sizable scars.<sup>8-14</sup> There has therefore been an understandable reluctance of both doctors and patients to adopt this method in the treatment of hyperhidrosis.

Thoracoscopy was first performed in 1910,<sup>15</sup> and the first report describing this method of performing sympathectomy appeared in 1942.<sup>16</sup> In Europe several hundreds of thoracoscopic sympathectomies were performed during the 1940s.<sup>17</sup> For unknown reasons this method fell into oblivion and was not adopted on a larger scale until the late 1980s. In 1987 we developed a thoracoscopic method by which the upper thoracic sympathetic ganglia are electrocauterized.<sup>18-21</sup> Reports in the popular press gave us the opportunity to operate on a large number of patients during a short period of time. The purpose of this report is to assess the efficacy and safety of this technique in our first 850 patients.

### PATIENTS AND METHODS

We have not used any objective method to quantify sweating. The indication for the operation was disabling

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hyperhidrosis as defined by the patient. Thorough disclosure of the expected effects, side effects, and risks of the procedure were given before acceptance for surgery. Of the 850 patients, 39% were men and 61% women. Their median age at the time of the operation was 27.2 years (range, 9 to 72 years). The duration of hyperhidrosis was as long as they could remember in 62%, since puberty in 33%, and during adulthood in 5%.

A positive family history (parent, child, brother, or sister with hyperhidrosis) was found in 33%. After the operation the long-term results were evaluated by questionnaire.

The operation is performed with the patient under general anesthesia with a standard single-lumen endotracheal tube. The patient is placed in a half-sitting position, and hypotension was controlled with dihydroergotamine. A small (7 mm) punch incision is made 2 cm caudal to the midportion of the clavicle or in the anterior axillary line, and 2 L of carbon dioxide is insufflated in the pleural cavity through a Verres needle. A modified urologic transurethral electroresectoscope (7 mm cannula) is then introduced through the same punch incision between the ribs. As the lung is depressed by the gas, an excellent view of the upper part of the thoracic cavity is obtained. In palmar hyperhidrosis the second and third thoracic sympathetic ganglia are destroyed by electrocautery. In axillary hyperhidrosis the fourth ganglion and in facial involvement the lower part of the first ganglion are also destroyed. After exsufflation of the gas and closure of the wound, the operation is repeated on the other side. The wound is closed with a purse-string suture to reduce the size of the scar.<sup>22</sup> Median operation time for a bilateral procedure is 20 minutes. Chest radiography is performed a few hours after the operation to exclude progressive hemothorax or pneumothorax. The patient is discharged from the hospital the day after the operation. Patients living close to the hospital may undergo the procedure as outpatient surgery, but most of our patients live rather far away. Most patients resume work within a few days and sports activity within 2 weeks. The total cost of the procedure is about \$3500.

## RESULTS

The immediate postoperative result was excellent in 832 of 850 patients (98%). Primary failure to abolish sweating occurred in 18 patients (five bilateral and 13 unilateral procedures). Incomplete transection of the nerve was caused by either abnormal branching of the sympathetic chain or difficulties identifying the nerve in patients with abundant subpleural fat. During a median follow-up of 31 months (range, 2 to 80 months) recurrent symptoms have developed in 17 patients (11 bilateral and five unilateral procedures). No recurrences have occurred

after more than 2 years postoperatively. Reoperation was successful after primary failure or recurrence in all except two patients. At follow-up 98% of all the patients were satisfied with the result. The remaining 2% were dissatisfied because of a variety of reasons, mainly severe compensatory hyperhidrosis and Horner's syndrome.

## Complications

There was no mortality or life-threatening complications. Hemothorax in five patients and pneumothorax in four were treated by intercostal drainage. All cases resolved without sequelae. Horner's syndrome occurred in three cases; two were permanent and one was transient.

## Side effects

Postoperative pain was generally not a problem, and 39% required mild analgesics for a median of 3.4 days postoperatively. Compensatory sweating, primarily of the trunk, occurred in 55% of patients. In most cases this was minor, but about 2% of the patients considered this almost as disturbing as their original hyperhidrosis. Gustatory sweating appeared in 36% of the patients, but few considered this a major problem. Anticholinergic drugs seemed helpful for some patients with pronounced gustatory sweating. The hands often became warm and dry during the first months postoperatively. Moisturizing ointments were used by 25% of the patients during this period. In time some natural moisture generally returns. A positive side effect is the abolition of emotional facial blush. This was the major indication for operation in a few patients. Another side effect is cardiac sympathetic denervation that leads to an approximately 10% reduction in the heart rate both at rest and during exercise.<sup>23</sup> Only 15% of our patients had reported awareness of this.

## DISCUSSION

Medical treatment appears to be successful in only the mildest cases of hyperhidrosis. Thus at the time of operation most of our patients had tried a variety of conservative treatments with disappointing results. Open surgical sympathectomy has previously been the sole method for permanent cure. Because the upper dorsal sympathetic chain is relatively inaccessible, none of the different open surgical approaches is simple and each carries some risk of complications. In comparison with open surgical sympathectomy, endoscopic electrocoagulation en-

tails minor surgical trauma, shorter convalescence, virtually invisible scars, and fewer complications. The incidence of Horner's syndrome after conventional surgery is up to 40%,<sup>2</sup> whereas it occurred in 0.3% in our series and 0% to 3% in other reports<sup>24-32</sup> of thoracoscopic sympathetic ablation. Other complications of open surgery such as brachial palsy, phrenic nerve damage, winged scapula, chylothorax, and recurrent laryngeal nerve damage do not occur after thoracoscopic electrocautery.

Previous reports of thoracoscopic sympathetic surgery have mostly been confined to a small series of patients with short follow-up times.<sup>24-32</sup> Our results show the excellent effects of endoscopic sympathetic ablation by electrocautery in a large series of consecutive patients. Previous reports of open surgical techniques for sympathectomy have included long-term follow-up. Our results are equally good in a medium-term perspective. It is too early to be certain of the long-term results of electrocautery of the sympathetic chain compared with surgical excision, but an indication of lasting effects is the fact that recurrences have not increased with time. A medicolegal objection to electrocautery destruction compared with surgical excision of the sympathetic chain is the lack of a histologic specimen to prove that the correct procedure was carried out. However, histologic examination revealing autonomic nerves gives a false impression of adequacy and does not prove that the correct ganglia were excised. The second thoracic ganglion is the key segment for innervation of the upper extremity<sup>33</sup> and if this is missed, the procedure is bound to fail. Furthermore, approximately 10% of persons have an extraneural pathway lateral and parallel to the main sympathetic trunk (the nerve of Kuntz).<sup>34</sup> Failure to destroy this might lead to incomplete denervation.

Because of the magnitude of the procedure and the complication rate, open surgical sympathectomy can now be relegated to medical history. Endoscopic transthoracic sympathicotomy is easy, fast, inexpensive, and efficient and may be the method of choice in the treatment of disabling hyperhidrosis of the palms, axillae, and face.

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