

Case Illustration of a Patient with Hyperhidrosis Treated by ETS and Outcomes Review of ETS at a Single Institution

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Abstract

Background: Hyperhidrosis is a disorder characterized by excessive sweating, predominantly of the hands, axillae, and feet. Patients suffering from severe hyperhidrosis who have not responded well to non-invasive treatments such as botulinum toxin injections or prescription antiperspirants may undergo an endoscopic thoracic sympathectomy (ETS). An ETS involves cauterizing or, more recently, clipping the sympathetic nerves at the T2-T3 vertebral level just lateral to the sympathetic trunk. The procedure generally decreases the amount of sweating in the original problematic area; however, a major side effect is compensatory sweating and increased total body sweating. Patient satisfaction with this procedure has been reported at rates ranging from 29-95%. This paper illustrates a single case of primary hyperhidrosis and discusses the results of ETS therapy at a single institution.

Introduction

Primary hyperhidrosis is a condition characterized typically by palmar and/or axillary sweating in excess of the body's physiologic demand. The prevalence of hyperhidrosis in the United States is estimated to be 2.8%. For patients who suffer from excessive, in some cases constant perspiration, the implications can be embarrassing (cold wet handshakes) or even debilitating (soiled paperwork). One national survey of individuals with hyperhidrosis reported that 21.6% found their sweating

barely tolerable and frequently interfering with their daily activities, while another 10.8% found it intolerable and always interfering. In the same study, 13.4% of sufferers reported having lost time at work as a direct result of sweating attacks.¹³

While the etiology of hyperhidrosis is unclear, it is classically believed to result from dysfunction of the sympathetic nervous system, leading to excessive stimulation of eccrine sweat glands. This over-activation may originate in the hypothalamus, or peripherally at the synapses between the sympathetic neurons and the sweat glands themselves.^{2,11} The vagueness of primary hyperhidrosis' pathophysiology has hampered its treatment over the last one and half centuries of documented medical therapies.

There are several non-invasive therapeutic options for hyperhidrosis, including botulinum toxin injections and prescription antiperspirants. For patients who do not respond well to these treatments, surgical options are often considered. Since the 1920's, endoscopic thoracic sympathectomy (ETS) has been a mainstay of hyperhidrosis therapy for medically refractory patients.¹² This procedure involves deflation of the lung and endoscopic clipping or disruption of the segmental sympathetic roots at T2-3 (figures 2a & 2b). ETS generally decreases the amount of sweating in the original problematic area, however a cache of potential side-effects have made it a somewhat controversial therapy. Post-operative complications such as pneumothoraces, bradycardia, dysesthesias, iatrogenic Horner's syndrome, palmar over-dryness, and rebound sweating have all been commonly reported in the literature.³ Due to the largely social/psychological quality of both the benefits of successful ETS and risks of its most severe potential side effects, the overall value of this surgery to the patient is essentially subjective.

This paper describes a single case of primary hyperhidrosis treated with ETS and reviews the outcomes of ETS therapy noted at a single institution over the last 10 years.

Patient Case

JH is a 17 year old female who presented with severe, bilateral palmar and plantar sweating. Her symptoms were increased with stressful

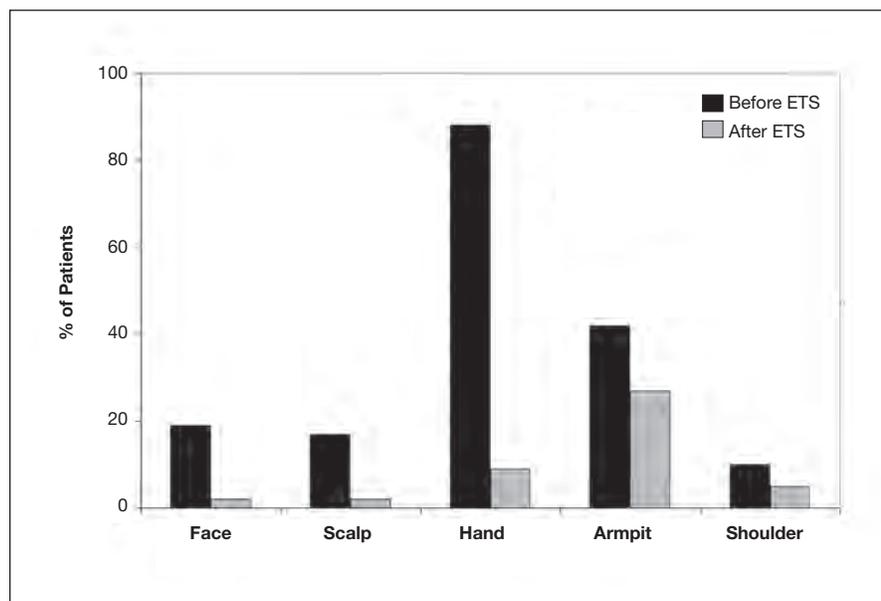


Figure 1

Effects of ETS surgery by location. Chart shows percentages of patients in study reporting excessive perspiration in specific regions of body prior to, and following, ETS surgery

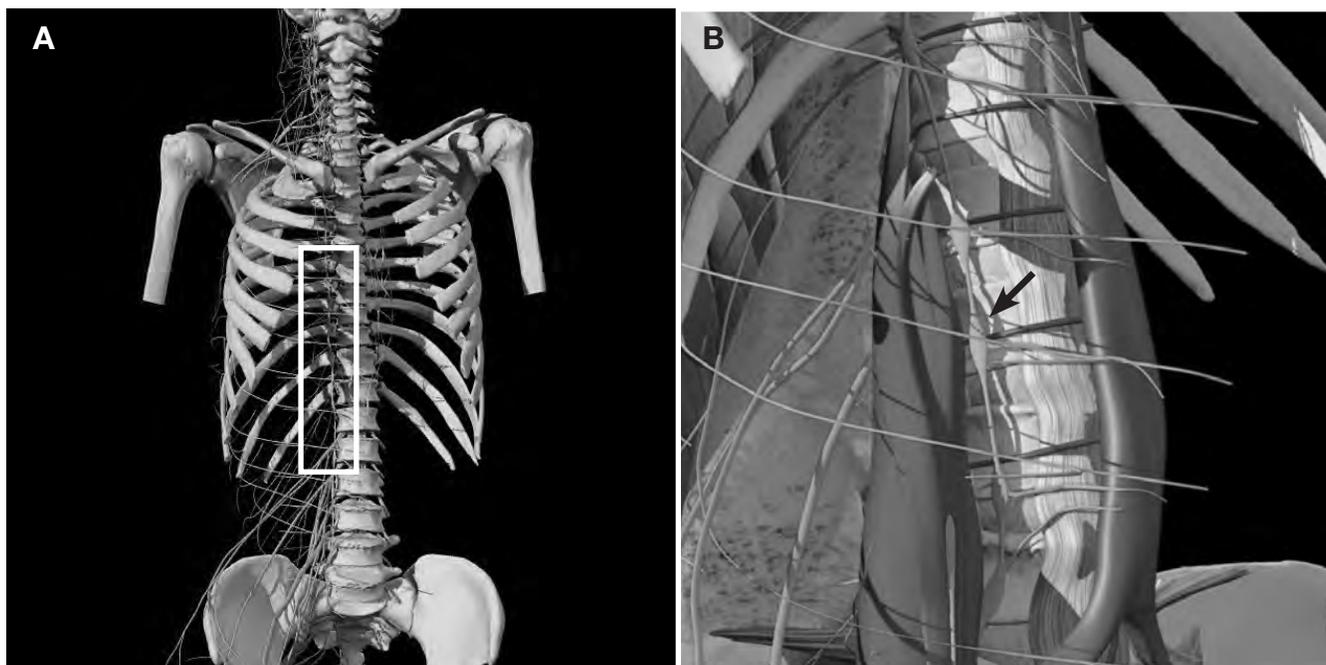


Figure 2

Sympathetic trunk. An ETS involves cauterizing or clipping the sympathetic nerves at the T2-T3 vertebral level just lateral to the sympathetic trunk.

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social situations and were disproportionate to the situations themselves. Compared to her plantar skin, her palmar sweating was consistently more severe. These episodes of hyperhidrosis did not accompany any discomfort or skin discoloration. A physical exam and review of symptoms did not elicit any other pertinent findings.

JH was initially treated with a course of anti-perspirant medications, including aluminum chloride hexahydrate, iontophoresis, and oral beta blockers which failed to provide sufficient symptom relief. An endoscopic thoracic sympathectomy (ETS) was therefore chosen as the next step in treatment.

The patient was taken to the operating room and positioned in the lateral decubitus with the posterior-, mid-, and anterior-axillary lines exposed and easily accessible. Two endoscopic ports were placed after a sterile prep. One port entered in the 3rd intercostal space between the anterior- and mid-axillary lines; a second port entered in the 5th intercostal space between the anterior- and mid-axillary lines. The ipsilateral lung was deflated and gently retracted medially to expose the costovertebral junction. Once the sympathetic chain was identified, a harmonic scalpel was used for endoscopic dissection to

unveil the T2 and T3 ganglia. The surgeon then clipped these ganglia. Following hemostasis, the lung was reinflated, and the ports were removed and closed. This procedure was repeated on the contralateral side. At the end of the case, bilateral chest tubes were left.

After the ETS, JH reported a significant reduction in plantar and, more significantly, palmar perspiration. No evidence of increased perspiration in other areas of their body could be found, and the patient did not suffer any complications. On postoperative day #2, the chest X-rays showed no pneumothoraces, and the chest tubes were removed. The patient was discharged in good health on postoperative day #2.

Discussion

The symptoms of hyperhidrosis can have dramatic social and psychological implications in the day-to-day lives of patients. In many cases, the perspiratory pathology can be sufficiently controlled through conservative treatments such as aluminum chloride, botulinum injections, and ditropan.⁵ Certain patients, for whom these non-invasive measures are inadequate, may achieve greater relief of their hyperhidrosis symptoms through surgical ligation of the thoracic sympathetic chain. Palmar

hyperhidrosis has been found to be the most responsive subset of symptoms to surgical intervention.^{4, 6,14} In a review of 83 patients treated with ETS at our institution between 1997 and 2007, we witnessed similarly positive results when treating palmar hyperhidrosis (figure 1). Our data demonstrated a 9-fold reduction in palmar hyperhidrosis complaints post ETS surgery when compared to prior (88% to 10%, $p < 0.001$).

Past authors have suggested that thoracic sympathectomies may have a positive effect on plantar hyperhidrosis as well, however a wide range of cure rates (3-64%) have been reported.^{4, 7,10,15} Our own experience yielded similar results. We found a small and statistically insignificant decrease in plantar hyperhidrosis complaints following ETS. This trend towards reduced plantar perspiration was recognized in 17% of patients, including the case presented above. Possibly, with a larger cohort, the finding may reach significance. Compounding this vagueness is the fact that the mechanism through which ETS relieves plantar hyperhidrosis remains unclear. The relevant sympathetic pathways bypass the thoracic chain, leaving the spinal medulla between T10 and L2, well caudal to location of ETS ligation.⁹ Plantar hyperhi-

drosis' response to ETS surgery is unpredictable, and in some series, initially positive results have been noted to fade over time.¹⁵ Taking all this into account, it is not recommended that plantar hyperhidrosis alone be used to justify an ETS procedure.

Palmar hyperhidrosis is recognized as the most socially detrimental symptom of primary hyperhidrosis. The palms are used extensively in daily activities and personal interactions, and excessive perspiration may be embarrassing and difficult to disguise. This may account for the fact that in many studies the palmar symptom response to ETS surgery seems to dictate overall patient satisfaction.⁶

In our review of 83 ETS patients, we noted a substantial reduction in palmar hyperhidrosis, with overall patient satisfaction of 95%. We found this to be in line with past reports.^{4,6,14} This high level of patient satisfaction is particularly interesting given the rates of post-surgical side effects; 66% of patients reported compensatory sweating and 44% reported gustatory sweating. Our data found no indication that gustatory sweating had any impact on overall patient satisfaction. As for compensatory sweating, though several authors have argued that it also has no effect on overall satisfaction, our data suggest that it does have a moderate impact.⁶ Patients experiencing compensatory hyperhidrosis still rated their ETS experience positively, though to a lesser degree than those free of the side effect (6.0/10 versus 8.9/10, respectively). This rather intuitive trend was explored further in a study by Chwajol, *et al.*, which found that "severe" compensatory hyperhidrosis negatively impacted patient satisfaction rates with ETS. They suggested that T3 ganglionectomies,

as part of ETS surgery, may help reduce compensatory hyperhidrosis, thereby improving subjective patient outcomes.^{1,8}

Pain, both local to the surgical site and distant, is increasingly being recognized as a potential side effect of ETS. Despite this, few long-term studies of ETS outcomes have focused on its prevalence. We specifically questioned patients about post-surgical pain. No complaints of significant surgical site, axillary, facial, or arm pain were reported.¹⁴

Conclusion

ETS surgery is a tested and effective intervention for hyperhidrosis. In a well selected patient population, we found a success rate of 95%. The procedure has a significant impact on palmar and axillary hyperhidrosis. Its ability to reduce plantar hyperhidrosis, via pathways yet to be understood, was suggested by this study, though a more robust cohort may be necessary to demonstrate a significant effect. Compensatory hyperhidrosis and gustatory sweating are not uncommon after this procedure. Patients should be counseled in the preoperative period about these side effects, though their overall effect on post-procedure patient quality of life appears minimal.

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