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Thoracoscopic bilateral T3 sympathectomy for primary focal hyperhidrosis in children

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ABSTRACT

Aim of the study: Present our experience in the surgical treatment of primary focal hyperhidrosis of the hands by thoracoscopic bilateral T3 sympathectomy in pediatric patients.
Methods: Retrospective chart review of all patients operated between 2013 and 2015.
Results: We operated and included in the study 28 patients, 22 females and 6 males. Mean age was 14 (6–21) years. All patients had previously tried at least one form of medical therapy with no success. All patients were extensively counseled regarding the potential side effects of the sympathectomy. The operations were done in supine position with the arms extended. All patients were intubated with a double-lumen endotracheal tube for sequential lung isolation. We used a 5-mm port for the scope and a 3-mm port for the instruments, both placed in the axilla. The third rib was identified by fluoroscopy. The sympathectomy was done with monopolar cautery. Mean operative time was 43 (25–71) minutes. No chest tubes were used. The incidence of intraoperative or postoperative complications was zero. All patients were discharged within the first 24 postoperative hours. All patients achieved immediate complete postoperative resolution of the palmar hyperhidrosis, sustained in all cases at a median follow-up of 17 (2–34) months. The mean preoperative *quality of life score* (based on a multifunctional self-assessment questionnaire) was 41/100, whereas after the operation, it was 92/100. Only 1 patient developed temporary compensatory sweating. All patients were satisfied with the result of the operation.
Conclusion: Thoracoscopic bilateral T3 sympathectomy is a safe and effective treatment for children and adolescents with primary focal hyperhidrosis of the hands who failed medical management and have a very low rate of compensatory sweating.
Level of evidence: IV.

Primary focal hyperhidrosis affecting children and teenagers can be a devastating condition. Medical therapies rarely work effectively, are not free of side effects, and are not a definitive cure (when the patient interrupts the medical treatment the symptoms recur immediately). Thoracoscopic sympathectomy provides a definitive cure for the hand involvement and can also provide relief in the excessive sweating of the underarms and feet. However, there are a wide variety of surgical approaches described in the literature and little consensus on what is the ideal level or levels at which the sympathetic chain should be interrupted.

The aim of our study was to present the outcomes of a series of patients who underwent a bilateral thoracoscopic sympathectomy (strictly a sympathotomy) at the T3 level for the treatment of palmar primary focal hyperhidrosis.

1. Materials and methods

After obtaining institutional review board approval (IRB 16-012697), we performed a retrospective chart review of all patients who underwent bilateral thoracoscopic T3 sympathectomy for palmar primary focal hyperhidrosis between May 2013 and October 2015 at the Children's Hospital of Philadelphia.

1.1. Preoperative evaluation

Patients were initially evaluated in the outpatient setting and screened for systemic diseases to rule out secondary hyperhidrosis by a thorough history and physical examination. Only patients with palmar involvement were considered candidates for the surgery. Patients with no palmar involvement were not offered any type of surgical procedure. In order to be eligible for the surgery, patients must have tried at least one form of medical therapy (e.g. botulinum toxin, iontophoresis, oral glycopyrrolate or topical antiperspirants). During the first visit, the patients and parents were given all the information about the potential benefits and risks of the surgery, as well as the possibility of developing postoperative compensatory sweating (CS). Thoracoscopic sympathetic

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chain anesthetic blockage as a preoperative test to predict the development of compensatory sweating was not offered, because of the double general anesthesia risk and the low sensitivity of the procedure. During the first visit, the patients and parents were also given several up-to-date articles obtained from PubMed with outcomes data from different centers, and they completed a "quality of life" (QOL) questionnaire. Patients and parents were told to schedule a second visit at least 2 weeks later if they were still interested in surgery. During the second visit, patients had an interview with a pediatric psychologist. The main goal of that evaluation was to make sure that the patients' expectations about how life would change after the operation were not unreasonable and to make sure that they understood all the implications of the operation. Additionally, all patients underwent an electrocardiogram to rule out severe baseline bradycardia.

1.2. Quality of life questionnaire (QOL)

The QOL questionnaire was designed to evaluate the patient's perception of how much the hyperhidrosis affected their daily life at the following levels: functional (writing, manual work, grasping objects, typing on a keyboard, using a touchscreen), social (shaking hands, holding hands, socializing with friends, playing sports, other activities), and in stressful circumstances. The questionnaire has a maximum score of 100 points (Fig. 1). This QOL questionnaire was completed at the preoperative visit and at every postoperative follow-up visit, along with a postoperative assessment section.

1.3. Surgical technique

Patients were in supine position with the arms extended and the elbows flexed. A double-lumen endotracheal tube was used in all cases. A 5-mm port and a 3-mm port were placed in the right axilla after disconnecting the right lung from the ventilator circuit. CO_2 pneumothorax was used at a pressure of 4 cm of H_2O. A 5-mm 30-degree scope was used in all cases. Once the lung was completely collapsed, the head of the third rib was identified by inspection and confirmed by fluoroscopy. After identifying the sympathetic chain, a sympathotomy (technically not a sympathectomy) was done with electrocautery by means of a 3-mm hook on the head of the third rib, extending the burn along the third rib for a length of 6–7 cm to cauterize potential bypassing branches of the chain (e.g. the nerve of Kuntz). Once this was completed, we removed the scope and placed a 14Fr red rubber catheter in the pleural space through the 5-mm port and a 2.7-mm scope through the 3-mm scope. We stopped the insufflation and requested the anesthesiologist to reconnect the right lung to the ventilator and provide high-pressure ventilation in order to reexpand the right lung, while keeping the end of the red rubber catheter under water in a basin. No chest tube was placed. Once this was completed, we repeated the procedure on the left side exactly in the same way. All patients were extubated after the surgery and underwent a chest x-ray in the recovery room.

1.4. Postoperative follow-up

Patients were admitted for a 23-hour observation period. After discharge, they were seen in the outpatient clinic at 1 week and 1 month after the surgery and were followed by email and/or phone at 6 months, 1 year, and yearly thereafter.

2. Results

28 (22 female) patients were included in this study. Mean age at surgery was 14 (6–21) years. All patients had previously tried at least one form of medical therapy, with minimal to no success.

The mean operative time was 43 (25–71) minutes. We did not encounter pleural adhesions in any of the cases. The sympathetic chain was easily visible in all cases. No chest tubes were used. The incidence of intraoperative or postoperative complications was zero (no hemithorax, no pneumothorax, no Horner syndrome, no infections and no mortalities). All patients were discharged within the first 24 postoperative hours. Two patients were discharged on the same day of the surgery.

All patients achieved immediate complete postoperative resolution of the palmar hyperhidrosis, having dry hands from the moment they recovered from the anesthesia, maintained in all cases at a median follow-up of 19 (4–36) months with only one mild recurrence. The postoperative pain level was mild in most cases. There were no readmissions. Approximately 30% of the patients experienced

Hyperhidrosis - Preoperative self-assessment questionnaire

Name: **Age:** **Gender:** **Date:**

In general terms, how would you rate your quality of life now (*BEFORE*) surgery?				
Very Poor	Poor	Good	Very Good	Excellent
1	2	3	4	5

When did you start having symptoms? _____

Does anyone in your family have the same symptoms? ☐ No ☐ Yes:

What areas of your body are affected?

☐ Right hand ☐ Left hand

☐ Right axilla ☐ Left axilla

☐ Right foot ☐ Left foot

☐ Other: _____

What medical therapies have you tried?

Aluminum Cl (Drysol) Glycopyrrolate (Robinul) Botox Iontophoresis

How long have you tried medical therapies? _____

Do you have any cardiac problems? ☐ No ☐ Yes:

Do you have any thyroid problems? ☐ No ☐ Yes:

Do you have any other medical problems? ☐ No ☐ Yes:

Do you take any daily medications? ☐ No ☐ Yes:

Functional Area – How do you rate your quality of life when performing these tasks?

	Very Poor	Poor	Good	Very Good	Excellent
Writing	1	2	3	4	5
Manual work	1	2	3	4	5
Grasping objects	1	2	3	4	5
Typing on keyboard	1	2	3	4	5
Using a touchscreen	1	2	3	4	5
Total score (5 to 25)					

Social Area – How do you rate your quality of life when doing the following activities?

	Very Poor	Poor	Good	Very Good	Excellent
Shaking hands	1	2	3	4	5
Holding hands	1	2	3	4	5
Socializing with friends	1	2	3	4	5
Playing sports	1	2	3	4	5
Other activities:	1	2	3	4	5
Total score (5 to 25)					

Interaction with others

	Strongly agree	Agree	Disagree	Strongly Disagree
People notice my excessive sweating	1	2	3	4
People avoid me because of my excessive sweating	1	2	3	4
I frequently avoid social interactions	1	2	3	4
I am overall less confident	1	2	3	4
I have trouble maintaining relationships	1	2	3	4
Total score (5 to 20)				

Stressful circumstances – How do you rate your quality of life in these situations?

	Very Poor	Poor	Good	Very Good	Excellent
In a warm room	1	2	3	4	5
When you are worried	1	2	3	4	5
Taking an exam	1	2	3	4	5
Speaking in public	1	2	3	4	5
Other situations:	1	2	3	4	5
Total score (5 to 25)					

Total score: (21 to 100)	

AFTER SURGERY ONLY

Compensatory Sweating

Have you experience any compensatory sweating? **NO** **YES**

Where?

Chest **Back** **Thighs** **Other:**

How severe?

Mild **Moderate** **Severe** **Intolerable**

Does anything make it better?:

Does anything make it worse?:

Would you have the operation done again?	
Would you recommend the surgery to others?	
Is there anything you wish we had told you before the surgery that we did not tell you?	

Fig. 1. Quality of life questionnaire that patients complete during the preoperative and all postoperative follow-up visits. Postoperative evaluation form of the incidence and severity of compensatory sweating and overall patient satisfaction.