



Thoracoscopic sympathectomy for palmar hyperhidrosis: How young is too young?

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ABSTRACT

Background/Purpose: Primary hyperhidrosis affects 1%–3% of the general population, with increased incidence in teenagers, having an important impact in the quality of life. This study evaluates the efficacy and patients' satisfaction after bilateral thoracoscopic sympathectomy.

Methods: Retrospective analysis of pediatric patients with palmar primary hyperhidrosis that underwent bilateral thoracoscopic sympathectomy over the last eight years. The procedure was performed with 2 ports and simple transection of the sympathetic chain. Pre and postoperative sweating severity was evaluated by telephone interview, using the Hyperhidrosis Disease Severity Scale (HDSS).

Results: 23 patients (19 girls; 15.5 [11–19] years-old) underwent bilateral thoracoscopic sympathectomy. All complained of palmar hyperhidrosis, which resolved in all cases. Compensatory sweating occurred in 47.8% of patients. 21 patients answered the telephone interview: all of them would recommend the surgery to others. Sweating severity improved in all patients, with a mean decrease of 1.95 values of the HDSS from preoperative to postoperative evaluation ($p < 0.05$). There was neither morbidity nor mortality.

Conclusions: Bilateral thoracoscopic sympathectomy is a safe and effective treatment for primary palmar hyperhidrosis. Being the first report on pediatric application of HDSS, we conclude that children are very satisfied with the final outcome.

Type of study: Treatment study.

Level of evidence: Level III.

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Hyperhidrosis is defined as a pathologic condition of excessive sweating in amounts greater than the physiologically needed for thermoregulation. This sweating is not related to the ambient temperature and is clearly disproportionate to it [1]. Primary or idiopathic hyperhidrosis affects 1% to 3% of the population [2] and up to 1.6% of children and adolescents younger than 18 years of age [3].

Patients with this condition usually suffer profound embarrassment (social, psychological and emotional), and the degree of impairment of quality of life is even comparable to that seen in patients with chronic diseases such as severe psoriasis and kidney failure [4].

Nowadays, several authors state that endoscopic thoracic sympathetic chain section (sympathectomy) or resection (sympathectomy) is the most effective treatment for palmar hyperhidrosis, because it is a minimally invasive procedure that is safe and aesthetically acceptable [2,5–7].

The aim of this study is to present the outcomes of a series of pediatric patients who underwent bilateral thoracoscopic sympathectomy (BTS) for the treatment of primary palmar hyperhidrosis. This is the

first report on pediatric application of the Hyperhidrosis Disease Severity Scale (HDSS).

1. Material and methods

A retrospective chart review of all patients who underwent BTS for primary palmar hyperhidrosis between August 2012 and August 2019 was conducted.

Data collected included gender, age, body weight, past medical history, location of excessive sweating (palmar, axillar and/or plantar), surgical procedure details (level of section and operative time), intra and postoperative complications, postoperative length of stay, and characterization of compensatory sweating.

At our department, we offer the patients both medical (aluminum-based antiperspirants and/or oxybutynin) and surgical treatment at presentation.

All patients underwent general anesthesia and double lumen endotracheal intubation. Patients were put in supine, semisitting position, with both arms abducted 90°. Two 5 mm access ports were inserted in the mid and anterior axillary lines over the third and fifth intercostal spaces, respectively. A 30° 5-mm camera was inserted in the anterior port and a 5-mm endoscopic hook in the posterior one. The sympathectomy was done bilaterally with electrocautery section of the sympathetic chain

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over the head of the rib, extending the burn along the rib for a length of 2–3 cm to cauterize potential bypassing branches of the chain (nerve of Kuntz). The level of sympathotomy (R2–R4, R3–R4 or R3–R5) was done according to surgeons' preference. After lung expansion and pleural space aspiration, no chest tube was routinely left in place. Postoperative chest radiography was obtained in all patients.

A telephonic interview was done to apply the HDSS to evaluate the disease severity both pre and postoperatively. The HDSS consists of only one question with four options of answers related to the implications to patient's daily routine and the degree of tolerance to the symptoms (Fig. 1) [8]. It is a simple and feasible method, showing acceptable validity when evaluating hyperhidrosis severity and assessing treatment results over time [9].

Local institutional review board approved this study.

Categorical variables were compared with Fisher's exact test. Continuous variables are expressed as median [range]. Pre and postoperative results from the HDSS were compared using a paired sample t-test. The significance level was set at 0.05.

2. Results

23 (19 female) patients were included in this study. At time of surgery, median age was 15.5 [11–18] years and median body weight was 50.4 [36–80] kg (Table 1). Positive past medical history was present in 4 (20%) cases: two patients had endocrine pathology (patient 4 had hypothyroidism and was medicated with levotiroxine; and patient 17 had adrenal congenital hyperplasia and was medicated with hydrocortisone), one had Crohn's disease (patient 5, treated with Infliximab); and another one with psychiatric pathology (patient 7, attention deficit hyperactivity disorder, medicated with sertraline).

All patients complained of palmar hyperhidrosis, and the majority (86%) referred severe symptoms before surgery (HDSS 3 or 4). Plantar sweating was present in the majority of patients (15/23, 65%), and the triad of palmar, axillary and plantar hyperhidrosis was present in 30% (7/23).

Five patients (5/23, 22%) tried medical treatment (4 antiperspirants, 1 oxybutinine) before surgery. Eighteen patients (18/23, 78%) opted for BTS as first treatment option.

The median operative time was 75 [48–97] min. R2 section was done in 3 cases, all before the year of 2016, when it was abandoned owing to literature review reporting increased risk of Horner's syndrome. Twelve patients (52%) underwent R3–R4 section, followed by R3–R5 sympathotomy in 35% of cases (8/23).

Majority of patients were discharged the day after. Four patients (4/23, 17%) remained admitted for 48 h after the procedure, owing to residual pneumothorax identified on serial chest radiography, and were treated with oxygen mask only.

There was resolution of palmar hyperhidrosis in 100% of cases, and in 92% (11/12) of axillary sweating. Four patients (4/15, 27%) stated mitigation of plantar sweating after the procedure.

There were no intraoperative complications. The global postoperative complication rate was 8.6% (2/23). Patient 5 showed a minor pneumothorax one week after the surgery that did not need drainage; and

patient 10 maintained axillary sweating after the procedure. There were no major postoperative complications.

Compensatory sweating (CS) developed in 47.8% (11/23) of patients. Of these, all except patient 14 complained of CS located in the torso; 4 patients also referred CS in the legs. As shown in Table 2, CS was more frequent in patients with 2-level section when compared to 3-level sympathotomy (6/12, 50% vs 4/11, 36%; $p = 0.68$), and more common in patients with plantar sweating (8/13, 62%).

Twenty-one patients answered the telephone interview for the HDSS (Table 3). The mean preoperative value for the HDSS was 3.2 and showed an average decrease of 1.95 values to the final outcome of 1.1 in the postoperative status [$t(20) = -12.39$; $p < 0.05$]. Only patients 7 and 10 referred that the CS sometimes affected daily activities (HDSS scale 2).

After a median follow up of 12 [2–69] months, there are no cases of surgical morbidity or recurrent hyperhidrosis. All patients would recommend the surgery to others.

3. Discussion

Primary hyperhidrosis affects 1.6% of adolescents and 0.6% of prepubertal children [10].

There are multiple nonsurgical treatments, but either most of them present important side effects or their results are time limited. Consequently, the majority of patients end up seeking surgical consultation [1]. Opposing to conservative management, which present symptoms recurrence once interrupted, BTS is the only curative treatment for primary hyperhidrosis, with several reports of 95% success rates in resolution of palmar hyperhidrosis [3,5,6,11]. Accordingly, we offered surgery as well as as medical treatment to all patients at presentation. Atkinson et al. described that sympathotomy has excellent results in treating primary hyperhidrosis and, compared to sympathectomy, shows lower compensatory sweating [12]. In 2012, a prospective study with children aged between 8 and 14 years old showed that BTS is a better option than conservative approach for the management of patients with severe palmar hyperhidrosis and poor quality of life [13].

Palmar hyperhidrosis has considerable negative effects on the child's quality of life, namely negative impact on daily functioning (such as difficulties handling a writing utensil, keeping papers dry, gripping the handlebar of a bicycle, manipulating a computer mouse or a video game controller) [14], as well as cause social phobia, anxiety and depression in teenagers [3]. This might explain why these patients actively seek medical care, as stated by Doolittle et al.: "children/adolescents (younger than 21 years old) with this condition are almost twice as likely to be seen by a health care physician (81%) than their adult counterparts (42%)" [15].

In our series, the majority of patients reported severe hyperhidrosis (HDSS 3 or 4) before surgery. In addition to complete resolution of palmar symptoms in all patients, nearly 30% of patients ceased having plantar sweating. As shown by the HDSS application, the disease severity significantly decreased after BTS: all patients showed improvement on their sweating severity; 91% stated that their remaining sweating is never noticeable; and only 2 patients with CS referred their sweating sometimes interfere with daily activities. So, in spite of having a CS rate of 48.7%, patients tend to tolerate well the remaining sweating, to the point that it almost never affects their daily life activities. On top of that, all patients would recommend the surgery to others.

Few reports have suggested these good results of thoracoscopic treatment of palmar hyperhidrosis in children. As Cohen et al. emphasized, we also consider that early surgery for severe palmar hyperhidrosis would save children many years of psychological and social discomfort [16]. Additionally, Steiner et al. showed that in spite of having CS, younger patients were gratified with the final result, as previously suggested by our data [17].

The Society of Thoracic Surgeons states that endoscopic thoracic sympathectomy is the treatment of choice for primary hyperhidrosis,

Hyperhidrosis Disease Severity Scale	
"How would you rate the severity of your hyperhidrosis?"	
<input type="checkbox"/> 1.	My sweating is never noticeable and never interferes with my daily activities
<input type="checkbox"/> 2.	My sweating is tolerable but sometimes interferes with my daily activities
<input type="checkbox"/> 3.	My sweating is barely tolerable and frequently interferes with my daily activities
<input type="checkbox"/> 4.	My sweating is intolerable and always interferes with my daily activities

Fig. 1. Hyperhidrosis Disease Severity Scale (HDSS) [8].

Table 1
Patients' demographics and outcomes.

Patient no.	Gender, Age (y), Weight (kg)	Hyperhidrosis location			Level of sympathectomy	Compensatory sweating	HDSS	
		Palmar	Axilar	Plantar			Preop	Postop
1	F, 15, 48	+	–	–	R2–R4	–	n/a	n/a
2	F, 13, 48	+	–	–	R2–R4	–	3	1
3	F, 15, 53	+	+	+	R3–R4	Truncal	2	1
4	F, 17, 51	+	+	–	R3–R4	–	2	1
5	F, 19, 51	+	+	+	R2–R4	–	4	1
6	F, 16, 52	+	+	+	R3–R5	–	4	1
7	F, 13, 80	+	+	–	R3–R4	Truncal and legs	3	2
8	F, 18, 59	+	–	+	R3–R4	Truncal and legs	3	1
9	F, 13, 69	+	+	+	R3–R4	–	n/a	n/a
10	F, 16, 59	+	+	+	R3–R5	Truncal and legs	3	2
11	F, 18, 63	+	+	+	R3–R5	–	4	1
12	F, 15, 49	+	–	+	R3–R5	Truncal	2	1
13	F, 16, 54	+	+	–	R3–R5	–	3	1
14	F, 15, n/a	+	–	–	R3–R5	Feet	4	1
15	F, 11, 36	+	+	+	R3–R4	Truncal	3	1
16	F, 16, 57	+	–	+	R3–R5	Truncal and legs	3	1
17	F, 15, 60	+	–	+	R3–R4	–	4	1
18	M, 14, 48	+	–	+	R3–R5	Truncal	4	1
19	M, 16, n/a	+	–	+	R3–R4	Truncal	3	1
20	F, 17, 55	+	+	–	R3–R4	Truncal	4	1
21	M, 11, 36	+	–	+	R3–R4	–	3	1
22	F, 15, 55	+	–	+	R3–R4	–	4	1
23	M, 18, 55	+	+	–	R3–R4	–	3	1

F, female; M, male; n/a, not available; +, present; –, absent; HDSS, Hyperhidrosis Disease Severity Scale.

Table 2
Compensatory sweating (CS).

	CS
2-level section	6/12, 50%
3-level section	4/11, 36%
Hands only	1/3, 33%
Hands + Axilla	2/5, 40%
Hands + Feet	5/8, 63%
Hands + Axilla + Feet	3/7, 43%

Table 3
HDSS results.

HDSS	Preoperative	Postoperative	Pre vs post
Mild or moderate (1,2)	3/21, 14%	21/21, 100%	$t(20) = -12.39; p < 0.05$
Severe (3,4)	18/21, 86%	0/21, 0%	

HDSS, Hyperhidrosis Disease Severity Scale.

and refer that the ideal candidate for the procedure is someone who is usually younger than 25 years old at the time of surgery [2].

Our results show that BTS is a safe procedure even in younger patients (two 11 years-old patients, a total of 5 patients younger than 14 years old). In addition, BTS significantly reduces the impact that excessive sweating has on children's daily activity, as shown by the HDSS results.

These findings, allied with those from the few previously published pediatric series, suggest that surgical treatment should be offered to children as early as they complain of daily life impairment owing to their excessive sweating. In addition, the HDSS seems to be a useful and simple instrument to evaluate the impact of primary hyperhidrosis on daily activities in children; therefore, we recommend its use by routine.

4. Conclusion

Primary hyperhidrosis impairs quality of life for children. Bilateral thoracoscopic sympathectomy is an effective, definitive and safe procedure, even in younger patients, and shows good postoperative outcomes.

We suggest that BTS should be offered as an optional first line therapy. The HDSS seems useful in evaluating the impact that primary hyperhidrosis has on children's daily activities.

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