

## Single port thoracoscopic sympathectomy for primary palmar hyperhidrosis in adolescence

Nesimi GÜNAL<sup>1</sup>, Berkant ÖZPOLAT<sup>1\*</sup>, Yasemin DERE GÜNAL<sup>2</sup>, Koray DURAL<sup>1</sup>

<sup>1</sup>Department of Thoracic Surgery, Faculty of Medicine, Kırıkkale University, Kırıkkale, Turkey

<sup>2</sup>Department of Pediatric Surgery, Faculty of Medicine, Kırıkkale University, Kırıkkale, Turkey

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**Aim:** Hyperhidrosis is defined as excessive sweating beyond the physiologic needs of a person. Palmar hyperhidrosis in the adolescent period may have an impact on school work and may cause psychological problems. In this study we aim to increase awareness of this disregarded problem.

**Materials and methods:** We explicated the early outcomes of 7 consecutive adolescents, where single port video-assisted thoracoscopic sympathectomy was performed for primary palmar hyperhidrosis. Patients were evaluated for symptom resolution, which was defined as complete dryness, patient satisfaction, operative complications, and compensatory sweating.

**Results:** In total 13 thoracoscopic procedures were done in 7 adolescents, consisting of 4 girls and 3 boys (median age = 16 years). Thoracoscopic sympathectomy achieved immediate complete dryness and all were very satisfied with the outcome of the procedure. Compensatory sweating was defined as mild by 4 (57%) patients.

**Conclusion:** Thoracoscopic sympathectomy is safe and effective for the treatment of primary palmar hyperhidrosis in the adolescent period without any major side effects.

**Key words:** Hyperhidrosis, video-assisted thoracoscopic surgery, sympathectomy

### 1. Introduction

Hyperhidrosis is a health problem having negative effects on adolescent quality of life, affecting daily social activities or educational life. Primary focal hyperhidrosis (PFH) is often observed in axillary, palmar, plantar, and craniofacial regions and more than one region can be involved (1). There is still no consensus about the mechanism of hyperhidrosis in adolescents. The prevalence is reported as 0.6%–1.0% in young populations (2).

Thoracoscopic sympathectomy, which is accepted as the gold standard for the permanent cure of PFH, is achieved by interruption of impulse transmission from sympathetic ganglia to the sweat glands (2,3). A few studies reported that surgery should be performed before adulthood, emphasizing that adolescents tolerate side effects better than adults (1,3–7).

Among adolescents, primary palmar hyperhidrosis (PPH) is widely disregarded and undertreated. To the best of our knowledge, there is no study reporting PPH treatment with single port video-assisted thoracoscopic sympathectomy (VTS) in adolescents in Turkey. Herein,

we report our experience and short-term outcomes of this treatment, where the symptom resolution, intraoperative and postoperative complications, patient satisfaction, and subsequent compensatory sweating (CS) are analyzed.

### 2. Materials and methods

Seven adolescents who underwent VTS for PPH between March 2011 and July 2012 were included. The indications for operation in our patients were chosen according to the Multi-Specialty Working Group on the Recognition, Diagnosis, and Treatment of Primary Focal Hyperhidrosis criteria: focal, visible, excessive sweating of at least 6 months in duration without an underlying cause, plus at least 2 of the following characteristics: a distribution that is bilateral and relatively symmetric, impairment of daily activities, at least 1 episode per week, onset before 25 years of age, family history of PFH, or focal sweating that ceases during sleep (8).

Data were collected retrospectively. The chief complaint of patients was palmar hyperhidrosis. Additional axillary hyperhidrosis was present in 6 patients

\* Correspondence: berkantozpolat@yahoo.com

and facial hyperhidrosis was present in 1 patient. The common distress of all patients was that during written examinations, their answer sheets became dragged due to excessive sweating. The physical and social inconvenience was accompanied by psychological problems. Conservative treatments like topical therapies and systemic medications brought no solutions.

Detailed history was obtained for the onset of symptoms, characteristics, and regions of sweating. Personal and social handicaps were also recorded. Patients and families provided informed consent and the benefits and potential side effects of the operation were explained in detail.

### 2.1. Surgical procedure

All the patients were operated on by the same team with similar surgical techniques. The VTS procedure was performed by using a left-sided double lumen endotracheal tube. The location of the tube was confirmed by using a pediatric fiberoptic bronchoscope as reported by Sazak et al. (9). The patient was placed in supine position. The chest was elevated 45° and the arms were abducted 75–80°. After infiltrating the subcutaneous tissue and intercostal space with 2 mL of 0.5% bupivacaine, an incision was made from the right 3rd or 4th intercostal space at the anterior axillary line. A 15-mm thoracoport was inserted and a 10-mm camera and other instruments were introduced using this single port. The sympathetic chain was identified, and as our routine protocol, T3–4 sympathectomy was performed for isolated palmar and palmar plus axillary hyperhidrosis. T2–4 sympathectomy was performed if facial sweating was also present. Sympathetic ganglia and chain division (sympathectomy) was done by diathermy. Ablation was extended laterally for 2 to 3 cm on the corresponding ribs to divide any accessory fibers, known as the Kuntz nerve, if present. Extreme caution was taken so as not to ablate the stellate ganglion, which was not usually seen endoscopically. A small chest tube was inserted from the port and the reinflation of the lung was controlled by the camera. The chest tube was connected to underwater drainage. The same procedure was done sequentially to the left side. The subcutaneous tissue was approximated by polyglactin sutures. Both chest tubes were withdrawn during exertion of continuous positive pressure by the anesthesiologist and the skin was closed accordingly.

The patients received prophylactic antibiotics and nonsteroidal antiinflammatory agents were ordered for postoperative pain. After discharge, the first follow-up examination was done on day 7. Data were derived from follow-up examinations and telephone interviews. Patients were evaluated for symptom resolution, which was defined according to complete dryness, patient satisfaction, operative complications, and subsequent CS. CS, if present, was graded as mild, moderate, or severe.

### 3. Results

The criteria for the diagnosis of PFH were met in all the patients. A total of 13 thoracoscopic procedures were done in 7 adolescents, consisting of 4 girls and 3 boys (13–18 years of age, median = 16). There was no conversion to open procedure. Six patients were operated on bilaterally (5 in 1 stage, 1 in 2 stages) (Figure) and 1 patient was operated on for the dominant hand.

Detailed history from parents showed that the sweating problem in all had started in the early childhood period and inclined up to early adolescence.

VTS achieved immediate complete dryness and all the patients were very satisfied with the outcome of the procedure. The mean follow-up time was 8.8 months (range: 5 to 23 months). CS was defined as mild by 4 (57%) patients. It was located at the back in 1 patient and at the abdomen in 3 patients. The extent of CS did not change with time, and when compared with their chief complaint, patients mentioned that this mild sweating did not affect their daily lives.

Postoperative complications such as ptosis, wound infection, or hemothorax were not observed in any patients. One patient had residual pneumothorax, which required thoracic drainage. In this patient a persistent air leak, which was probably due to an intraoperative lung injury, extended the discharge. After the total expansion of the lung the tube was withdrawn on day 5 and he was allowed to go home on day 7. In the other 6 patients the lung was completely expanded. These 6 patients were discharged uneventfully the next day. The median hospital stay was 1 day. The results are shown in the Table.



**Figure.** The obvious difference between the palmar regions of the patient who was operated on bilaterally in 2 stages. Photography after the first intervention.

**Table.** Patient demographics.

	Sex	Age (years)	Region of sweating	Site of VTS	Level	Com.	CS	Discharge (day)	Follow-up time (months)	Results of operation
#1	F	16	Palm., Ax.	Bil. (2 stages)	T3-4	-	+	1	8	Total satisfaction
#2	F	18	Palm., Ax.	Bil.	T3-4	-	+	1	8	Total satisfaction
#3	F	17	Palm., Ax.	Bil.	T3-4	-	+	1	7	Total satisfaction
#4	M	17	Palm., Ax.	Un. (left)	T3-4	-	-	1	23	Total satisfaction
#5	M	13	Palm., Ax., Fac.	Bil.	T2-4	Pnx.	+	7	6	Total satisfaction
#6	F	14	Palm.	Bil.	T3-4	-	-	1	5	Total satisfaction
#7	M	17	Palm., Ax.	Bil.	T3-4	-	-	1	5	Total satisfaction

Abbreviations: F: female, M: male, Palm.: palmar, Ax.: axillary, Fac.: facial, Bil.: bilateral, Un.: unilateral, Com.: complication, Pnx.: pneumothorax, CS: compensatory sweating.

#### 4. Discussion

Primary hyperhidrosis is the excessive sweating of a localized region like the palm, axilla, or face that is beyond physiological needs (5). Palmar hyperhidrosis may impair school performance and psychological well-being, and it can cause social and physical handicaps (7,10). We want to draw attention to 2 aspects of this disorder. First, there are few series dealing with children and adolescents. Second, in adult series it is reported that hyperhidrosis starts from childhood (1,3-7). Thus, it seems that many children suffer from this embarrassment during their formative years. Physiologically, sweating of the palms starts after birth, while axillary sweating starts after puberty (1). The patients in our series suffered excessive palmar sweating starting from an early childhood period. Additionally, in 6 patients, axillary hyperhidrosis began after puberty. Although the cause of this disorder is unknown, it is suggested that after puberty hyperhidrosis can be seen in more than one region.

Generally children and adolescents mentioned the use of conservative topical or systemic medications. In the literature, antiperspirants containing metallic salts like aluminum chloride, iontophoresis, botulinum toxin A injections, hypnosis, and acupuncture have been discussed widely and it is concluded that they offer only temporary relief (1,3). Our patients had tried various conservative approaches that were ineffective.

Surgical treatment for palmar or axillary hyperhidrosis is a permanent solution for adolescents who have tried other treatment options (3,5). In the literature, use of thoracoscopy for thoracic sympathectomy was defined by Kux (11). In our series, VTS was performed from a single 15-mm trocar with operation on both sides simultaneously in most of our patients, which ended in excellent results.

The procedure was performed by dividing the sympathetic trunk, called sympaticotomy. However, we prefer to use the term sympathectomy, which is often used synonymously with sympaticotomy, as mentioned by Licht and Pilegaard (12). It is obvious that VTS via a single port without placing chest tubes provides minimal operative trauma, short hospital stay, and quick return to school.

CS is the most common side effect of VTS and its pathogenesis is obscure. Its rate in recent series ranged between 6% and 100% and it was considered severe in one-third of the patients (2,3,6,13,14). Most of the discussion about CS regards the adult population and it has been suggested that the severity of CS is correlated with the extent of sympathectomy. Contradictions arise as excessive sympathectomy may lead to CS, whereas, if it is insufficient, it can be inefficacious. In a recent systematic review and metaanalysis, it was reported that T3 and T3-4 sympathectomy had the best clinical efficacy for the treatment of PPH. However, it was also reported that the efficacy rate of single ganglia sympathectomy was lower than that of multiple ganglia sympathectomy (15). Unfortunately, a metaanalysis comparing the extent of sympathectomy for multiple regions of hyperhidrosis and comparing different age groups is lacking.

Steiner et al. compared the results of VTS in different age groups and showed that CS is tolerated better by children. However, its adaptive mechanism is not known. They suggested that, besides symptomatic relief in younger patients, dry hands might improve some obstacles in social acceptance (3). In our series, CS was mild in 4 patients. The overall satisfaction was 100%, which was the net result of operative success. Although the severity of CS might change with time, it was reported that the rate of decrease of CS with time was double for younger patients (3). In

our series, the story of one patient was interesting. Due to the dripping of sweat from his fingers, a small pool formed on the floor of the classroom and was thought to be water spilled by the patient. He was ashamed when his teacher and friends recognized the reality. His teacher contacted his parents for a solution. Unfortunately, all our patients had similar embarrassing stories. If not treated, this anxiety can aggravate the hyperhidrosis and the hyperhidrosis will then increase anxiety. This vicious cycle has to be broken. All these adolescents were very pleased with the results of the surgery. With this study, we want to increase awareness of this disregarded problem.

VTS with 2 or 3 small incisions is the most common technique used. The single port VTS is a novelty having excellent cosmetic results and improved satisfaction (2,11,16,17). We have been using this single port technique for all age groups with similar advantages for the last 2 years.

We did not experience Horner's syndrome, which occurs due to stellate ganglion block (18) and is frequent in T2 sympathectomies. No painful stress was present in

our patients as we infiltrated the tissues with bupivacaine (19) up to the endothoracic fascia before skin incision for placement of the trocar and nonsteroidal antiinflammatory agents were given postoperatively. Other complications of the procedure are reported as pneumothorax, intrathoracic bleeding, and gustatory sweating (2,4,5,20,21). In our series one patient required insertion of a chest tube due to pneumothorax.

Although this study reports a small number of patients, the results are satisfactory enough to continue the surgical interventions. The limitation of this study is its retrospective nature and the short-term follow-up of the patients. Future prospective studies with a larger population and comparison of adolescent and adult sympathectomies in different aspects will give better results.

In conclusion, our findings showed that VTS can be performed both safely and effectively for PPH in the adolescent period, achieving complete dryness without any major side effects. As hyperhidrosis is not a self-limiting condition, we suggest that treatment should not be delayed until adulthood.

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