

# What's Causing This Teenager's Profusely Sweaty Palms?

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**A** 16-year-old girl presented with excessive sweating of the palms for the past 1 to 2 years. The excessive sweating occurred while she was awake but not during sleep. She described difficulties in performing schoolwork, because the paper she held often became wet, and she had difficulty grasping objects such as pens securely. In addition, the palmar sweating had severely limited her social activities. She tended to avoid shaking hands, and she was socially withdrawn.

She was otherwise healthy and was not on medications. A detailed history failed to reveal any precipitating factors. Her father had a history of mild excess sweating on his palms, which had responded well to treatment with a topical over-the-counter medication.

On examination, the girl's palms were wet. Sensation was intact, and no atrophy of the intrinsic muscles was noted in either hand. Systemic physical examination findings were normal.

## What's Your Diagnosis?

- A. Primary palmar hyperhidrosis
- B. Secondary palmar hyperhidrosis
- C. Atopic dermatitis
- D. Normal nonpathologic response to stress

### Answer: Primary Palmar Hyperhidrosis

A clinical diagnosis of primary palmar hyperhidrosis was made. She was treated initially with an over-the-counter aluminum chloride preparation used nightly, but this provided suboptimal benefit. She subsequently was treated with botulinum toxin type A injections of the palms, which resulted in 6 to 7 months of greater than 90% sweat reduction.

Palmar hyperhidrosis denotes excessive eccrine sweating on the palms beyond physiological needs to a degree that interferes with daily life, independent of environmental conditions such as hyperthermia or mental stress.<sup>1</sup> The condition can be primary (essential) or secondary to an underlying medical condition. In most cases, palmar hyperhidrosis is primary or essential, the cause is idiopathic, and it runs a benign course. This review focuses on primary palmar hyperhidrosis.

#### EPIDEMIOLOGY AND ETIOPATHOGENESIS

The estimated prevalence is 0.6% to 2.8% of the general population. The condition often begins in childhood and is most prevalent between 18 and 30 years of age.<sup>1-3</sup> The prevalence decreases dramatically in later life.<sup>1-4</sup> Palmar hyperhidrosis is more common in persons in Eastern countries in subtropical regions.<sup>1,5</sup> The condition is slightly more common in the female population.<sup>6</sup> A positive family history can be elicited in 30% to 50% of cases.<sup>7</sup>

The sweat glands in the palms are normal in histologic appearance and in number, with a density of approximately 600 to 700/cm<sup>2</sup>.<sup>1,8</sup> The sympathetic nervous supply to these areas is also normal. The condition is believed to result from localized hyperactivity of sympathetic cholinergic fibers that innervate the sweat glands and that pass through the upper dorsal sympathetic ganglia at T2-3, despite a normal body temperature.<sup>6,9-12</sup>

Aquaporins (AQPs) are water-selective channels that enhance the water permeability through the plasma membrane of cells.<sup>9</sup> It has been suggested that overexpression of AQP5 in sweat glands in the palms is involved in the pathogenesis of palmar hyperhidrosis.<sup>9</sup>

It has been speculated that the hypothalamic sweat center controlling the palms and soles is distinct from the rest of the hypothalamic sweat centers and is under the exclusive control of the cerebral cortex, without input from the thermosensitive elements.<sup>10</sup> Thus, sweating on the palms and soles rarely if ever occurs during sleep or sedation, nor is it augmented in a warm environment.<sup>11</sup>

In some families, the condition has an autosomal dominant mode of inheritance with incomplete penetrance.<sup>2,6,13</sup> The responsible genes have been mapped to 14q11.2-q13.<sup>2,6</sup>

#### CLINICAL MANIFESTATIONS

In primary palmar hyperhidrosis, the sweating is visible on both palms, and the involvement is symmetric.<sup>3</sup> The sweating

occurs during waking hours and not during sleep. The sweating is unrelated to ambient temperature but can be aggravated during periods of emotional stress, embarrassment, fear, anger, excitement, and anxiety.<sup>8,12,14</sup> The condition is often associated with plantar and axillary hyperhidrosis.<sup>4,6</sup> The degree of sweating is variable, ranging in severity from moderate moisture to severe dripping.<sup>12</sup> The palms may be cold as a result of evaporation of sweat and vasoconstriction.<sup>1</sup>

The Hyperhidrosis Disease Severity Scale is a validated 4-point disease-specific tool, with a score of 4 describing the sweating as “intolerable and always interferes with daily activities,” a score of 3 describing the sweating as “barely tolerable and frequently interferes with daily activities,” a score of 2 describing the sweating as “tolerable and sometimes interferes with daily activities,” and a score of 1 describing the sweating as “never noticeable and never interferes with daily activities.”<sup>15</sup> The scale can be used in the clinic to assess the severity of the problem and to tailor treatment based on disease severity.<sup>3</sup> Quality of life can be assessed with the use of the Hyperhidrosis Impact Questionnaire and the Dermatology Life Quality Index.<sup>16</sup>

#### DIAGNOSIS AND DIAGNOSTIC STUDIES

The diagnosis is mainly clinical, based on the history and physical examination findings. One major diagnostic criterion of primary palmar hyperhidrosis is visible and excessive sweating of the palms of at least 6 months' duration without an apparent cause.<sup>17</sup> At least 2 or more of the following minor criteria also must be fulfilled: bilateral and relatively symmetric involvement, impairment of daily activities, episodes at least weekly, age of onset less than 25 years, positive family history, and cessation of palmar sweating during sleep.<sup>17</sup>

The iodine test for starch or the quinzarin powder dusting technique can be used to delineate the precise pattern and extent of involvement.<sup>8</sup> Both techniques produce calorimetric changes induced by contact with water (sweat). Gravimetry can be used to quantify the sweat production.<sup>6</sup> Laboratory tests are usually not necessary. Referral to a dermatologist can be considered for therapeutic options.

#### COMPLICATIONS

Palmar hyperhidrosis adversely affects quality of life to an extent that is comparable with diseases such as severe acne or psoriasis.<sup>3,18</sup> Affected persons may have difficulty grasping objects such as pens. Also, the papers they hold may become wet, and the metals they hold may become corroded. This may impose restrictions on tasks and sport activities that persons may be able to perform.<sup>11</sup> They may be endangered if they handle electric or electronic instruments.<sup>4</sup> The condition is socially embarrassing; affected individuals tend to avoid shaking hands. As such, they may become socially withdrawn and have low self-esteem.<sup>10,11</sup>

The prevalence of anxiety and depression has been found to be much higher in individuals with hyperhidrosis.<sup>19</sup>

Palmar hyperhidrosis may aggravate atopic/eczematous dermatitis.<sup>10</sup> Affected persons are at risk for contact dermatitis and miliaria.<sup>8</sup> Hyperhidrosis may lead to maceration of the skin and a predisposition to bacterial, viral, and fungal infections at the affected sites.<sup>12,14</sup>

### PROGNOSIS AND MANAGEMENT

Without treatment, palmar hyperhidrosis often persists throughout life.<sup>10,14</sup> It tends to improve from the fourth decade of life as the activity of eccrine sweat glands decreases with age.<sup>11</sup>

For symptomatic treatment, topical application of an aluminum salt solution (in particular, aluminum chloride) is the first line of treatment.<sup>10,15</sup> The medication should be applied at night before bed to completely dry palms and then be washed off in the morning upon waking.<sup>11</sup> The medication acts by blocking the openings of the sweat glands and causing atrophy of secretory cells within the lumen of sweat ducts. In general, topical antiperspirants are widely available, inexpensive, easy to administer, and well tolerated. These topical medications have excellent safety profiles. Adverse effects may include irritant contact dermatitis and, rarely, allergic contact dermatitis.<sup>1</sup> These topical preparations do not work in every case of hyperhidrosis and are generally less effective on thicker skin such as that of the palms and soles compared with the skin of the axillae.

Iontophoresis causes blockage of the sweat duct with an ionized substance by directing a mild electrical current through the skin. Adverse effects generally are mild and can include erythema, vesiculation, pain, burning, a pin-pricking sensation, and dry, cracked skin.<sup>1,20</sup> Although iontophoresis is relatively free of adverse effects, the necessity for repetitive frequent treatments is a potential drawback.<sup>11</sup> Treatment can be made more effective with the addition of aluminum chloride or glycopyrronium bromide.<sup>21</sup> The success rate is in the 80% range.<sup>11</sup> The treatment is contraindicated in pregnant women, in persons with pacemakers or other metal implants, and in persons with medical conditions such as epilepsy and cardiac disorders.<sup>20</sup>

Oral anticholinergics such as glycopyrrolate and oxybutynin have been used with varying levels of improvement.<sup>22,23</sup> These medications inhibit sympathetic activation by competing for acetylcholine receptors on sweat glands.<sup>22</sup> Unpleasant adverse effects such as dryness of mouth, blurring of vision, drowsiness, dizziness, constipation, and urinary retention limit their use.<sup>11</sup> Also, these medications are usually used to control generalized sweating and might not be suitable for localized sweating such as palmar hyperhidrosis if in isolation.

Intradermal injection of botulinum toxin type A into the palms has been shown to be effective and safe for the treatment of palmar hyperhidrosis.<sup>7,24</sup> The procedure should be considered for persons with moderate to severe hyperhidrosis.<sup>3</sup> Botulinum toxins work by blocking the presynaptic release of acetylcholine

at the neuromuscular junction, thereby limiting the sympathetic stimulation of the eccrine sweat glands. Adverse effects can include pain at the injection site, dry skin, hematoma, flulike symptoms, and weakened handgrip, all of which are temporary and diminish with time.<sup>11,24,25</sup> The typical duration of therapeutic effect is approximately 6 months, so repeated injections are required to maintain the desired effect.

Endoscopic thoracic sympathectomy may be considered cases of intractable palmar hyperhidrosis refractory to conservative measures.<sup>1,26,27</sup> Thoracic sympathectomy can be performed not only with surgical intervention, but also with chemical (eg, ethanol) sympathectomy.<sup>28</sup> Video-assisted or computed tomography-guided endoscopic thoracic sympathectomy further improves the success rate with low recurrence.<sup>4,5,29,30</sup> Sympathectomy abolishes eccrine sweating in all areas supplied by the postganglionic fibers. In experienced hands, the success rate ranges from 95% to 100%.<sup>5</sup> Complications can include pain, wound infection, hemorrhage, pneumothorax, hemopneumothorax, chylothorax, intraoperative asystole, recurrent laryngeal nerve palsy, brachial plexus injuries, postsympathetic neuralgia, Horner syndrome, gustatory sweating, and compensatory hyperhidrosis in nondenervated areas.<sup>5,12,26,29</sup> A recent study showed that the adverse effect of compensatory hyperhidrosis, while common and annoying, does tend to improve with time.<sup>31</sup> ■

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which was identified in 54.4% of the EC cases. Other reported pathogens in cases of EC include *Klebsiella pneumoniae*, *Enterococcus* species, and *Candida* species. In Schicho and colleagues' analysis, most patients with EC (77%) were treated conservatively with antibiotics, and surgical treatment was required in 8.1%.<sup>2</sup> The mortality rate associated with EC was 7.4%.<sup>2</sup>

In their retrospective review of 28 consecutive cases of emphysematous UTI (15 EC, 13 EPN) over a 5-year period, Bjurlin

and colleagues reported that up to 10% of patients with either condition required surgical intervention, including partial or total cystectomy.<sup>3</sup> They concluded that EC should be managed with a combination of fluid resuscitation, aggressive antibiotic therapy, correction of reversible precipitating factors, and early indwelling catheter drainage. ■

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## What's Your Diagnosis?®

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