

Botulinum Toxin Type A For Primary Palmoplantar Hyperhidrosis in An Adolescent: A Case Report

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Abstract

Introduction: Primary hyperhidrosis is characterized by excessive sweating disproportionate to thermoregulatory needs and commonly begins during childhood or adolescence. It may cause substantial functional and psychosocial impairment. Botulinum toxin type A (BoNT-A) is a therapeutic option for focal hyperhidrosis that remains inadequately controlled with conservative therapy, although its use in pediatric patients remains limited and is considered off-label. **Case:** A 13-year-old boy presented with hyperhidrosis involving the palmar, plantar, and axillary regions since early childhood, with worsening symptoms over the preceding three years. The condition interfered with school activities and social interactions. Examination revealed bilateral and symmetrical hyperhidrosis, with a positive Minor's iodine–starch test in all three regions and a Hyperhidrosis Disease Severity Scale (HDSS) score of 3. Evaluation revealed no identifiable secondary cause. Topical aluminum chloride provided inadequate symptom control, while oxybutynin and iontophoresis were unavailable. BoNT-A (Lanzox) was administered intradermally to the palmar and plantar regions following 30 minutes of topical anesthesia combined with regional nerve blocks. The total administered dose was 148 units. **Discussion:** At the four-week follow-up, the Minor's iodine–starch test demonstrated reductions in the extent and intensity of staining in the palmar and plantar regions, while the HDSS score decreased from 3 to 1. The patient also reported improvements in daily functioning and self-confidence. The only reported adverse event was transient local pain, with no systemic complications. Clinical benefit was maintained throughout the six-month follow-up period. **Conclusion:** BoNT-A may be considered a therapeutic option for pediatric primary hyperhidrosis that causes substantial functional impairment and remains inadequately controlled with topical therapy. Its use requires individualized treatment planning, appropriate counseling and informed consent, adequate procedural pain management, and regular follow-up to assess the duration of clinical benefit and the need for repeat treatment.

Keywords: primary hyperhidrosis; adolescent; botulinum toxin type A; palmar hyperhidrosis; plantar hyperhidrosis; Hyperhidrosis Disease Severity Scale.

Introduction

Primary hyperhidrosis is characterized by excessive sweating that exceeds the physiological requirements for thermoregulation. It commonly begins during childhood or adolescence and may persist into adulthood. A positive family history is reported in approximately 30–50% of affected individuals, suggesting a potential genetic predisposition. Primary hyperhidrosis most commonly affects the palms, soles, and axillae and may substantially impair daily functioning and psychosocial well-being. In children and adolescents, excessive sweating may interfere with writing, handling objects, school activities, self-confidence, and social interactions.^{1,2}

The diagnosis of primary hyperhidrosis in children is primarily clinical and requires careful history taking and physical examination to exclude secondary causes, including endocrine disorders, systemic diseases, infections, and medications. Clinical features supporting a diagnosis of primary hyperhidrosis include excessive sweating for more than six months, onset before 25 years of age, bilateral and symmetrical distribution, recurrent episodes, interference with daily activities, and absence of excessive sweating during sleep. The Minor's iodine–starch test can be used to map areas of excessive sweating, guide the selection of injection sites, and document treatment response. Laboratory investigations, including a complete blood count, blood glucose measurement, and thyroid function tests, may be performed when clinically indicated to exclude secondary causes.^{3,4}

Management of primary hyperhidrosis should be individualized according to the patient's age, affected anatomical sites, disease severity, functional and psychosocial impact, treatment tolerability, and patient preferences. Topical aluminum salt–based antiperspirants are generally considered first-line therapy, while iontophoresis and anticholinergic agents may be considered when topical treatment provides inadequate symptom control. For focal hyperhidrosis that remains inadequately controlled with conservative therapy, intradermal botulinum toxin type A (BoNT-A) represents an effective therapeutic option. However, its use for

hyperhidrosis in pediatric patients remains off-label, requiring careful consideration of dosing, injection technique, procedural pain, adverse effects, and duration of treatment response.^{4,5}

Evidence regarding the use of BoNT-A for primary hyperhidrosis in children and adolescents remains limited and is derived mainly from case series, retrospective studies, and small prospective studies.^{6,7} Therefore, this case report describes the use of intradermal BoNT-A for primary palmo-plantar hyperhidrosis in a 13-year-old adolescent, with particular emphasis on treatment selection, dosing strategy, procedural pain management, clinical response, and safety.

Case Presentation

A 13-year-old boy presented to the Dermatology and Venereology outpatient clinic with excessive sweating of the palms, soles, and axillae. Palmar and plantar hyperhidrosis had been present since early childhood and had progressively worsened over the preceding three years. Episodes occurred during both strenuous and mild physical activity and were exacerbated by stress, anxiety, and hot weather. Excessive sweating also occurred in cold weather but was generally absent in air-conditioned environments. The symptoms ceased during sleep. The condition significantly interfered with his daily activities, particularly schoolwork; excessive palmar sweating caused the paper to become wet while writing and negatively affected his self-confidence and social interactions.

A family history of similar symptoms was reported in a cousin who had milder palmar and plantar hyperhidrosis. There was no significant history of systemic disease or use of medications known to induce hyperhidrosis. The patient had previously been diagnosed with hyperthyroidism; however, subsequent evaluation did not support this diagnosis. Thyroid function tests, complete blood count, other relevant laboratory investigations, chest radiography, and cardiological evaluation revealed no abnormalities that could explain secondary hyperhidrosis. Dermatological examination revealed bilateral palmar, plantar, and axillary hyperhidrosis without associated skin lesions. The Minor's iodine–starch test was positive in all three regions. The baseline Hyperhidrosis Disease Severity Scale (HDSS) score was 3. Based on the early age of onset, symptom duration of more than six months, bilateral and symmetrical distribution, recurrent episodes, interference with daily activities, positive family history, absence of excessive sweating during sleep, and lack of an identifiable secondary cause, the patient was diagnosed with primary multifocal hyperhidrosis involving the palmar, plantar, and axillary regions.

The patient had previously received topical aluminum chloride 15% for two months without meaningful improvement, followed by aluminum chloride 20% for one month, also without adequate response. Aluminum chloride 35% was subsequently used for three days but was discontinued because of local irritation. Thereafter, aluminum chloride 25% was continued as maintenance therapy and applied at night to completely dry palms, soles, and axillae, followed by washing the treated areas the following morning. Oral oxybutynin was considered but could not be administered because of limited drug availability. Iontophoresis was also unavailable.

Because adequate symptom control was not achieved with topical therapy, intradermal botulinum toxin type A (BoNT-A) was selected. Although axillary hyperhidrosis was also present, the palmo-plantar symptoms were more prominent and had the greatest impact on the patient's daily activities. The patient therefore elected to prioritize treatment of the palms and soles and declined additional axillary injections because of concerns regarding procedural pain.

BoNT-A (Lanzox) was administered as an outpatient procedure. Topical anesthesia was applied for 30 minutes, followed by median and ulnar nerve blocks for the palms and posterior tibial and sural nerve blocks for the soles. Injection sites were determined according to the distribution of sweating identified by the Minor's iodine–starch test and marked in a grid pattern at approximately 2-cm intervals on the palms and 2–3-cm intervals on the soles. Intradermal injections were performed using a 30-gauge needle.



Figure 1. Pre-injection marking of the palmar and plantar treatment areas.

A 100-unit vial of BoNT-A was reconstituted with 5 mL of 0.9% sodium chloride solution, resulting in a concentration of 20 units/mL (2 units/0.1 mL). A 50-unit vial was reconstituted with 2.5 mL of 0.9% sodium chloride solution to achieve the same concentration of 20 units/mL (2 units/0.1 mL). Each palm received 34 units distributed across 17 injection sites at 2 units per site, with approximately 2 cm between injection points. Each sole received 40 units distributed across 20 injection sites at 2 units per site, with approximately 2–3 cm between injection points. The total administered dose was 148 units, comprising 68 units for both palms and 80 units for both soles, with a total injection volume of 7.4 mL. Two units (0.1 mL) were not administered because of leakage during the procedure.



Figure 2. Intradermal injection of botulinum toxin type A into the palm.

At the four-week follow-up, the patient demonstrated clear subjective and objective improvement. The Minor's iodine–starch test showed a reduction in both the extent and intensity of staining in the palmar and plantar regions. The HDSS score decreased from 3 at baseline to 1 at four weeks. The patient also reported improvement in daily functioning, particularly in writing, as well as greater confidence in social interactions. The only reported adverse event was transient local pain, with no systemic complications. Clinical improvement was maintained throughout the six-month follow-up period.



Figure 3. Clinical and Minor's iodine–starch test findings before and four weeks after botulinum toxin type A injection.

Discussion

Primary hyperhidrosis is characterized by excessive eccrine sweat production associated with increased sympathetic cholinergic activity. It commonly begins during childhood or adolescence and may have a familial predisposition. In primary hyperhidrosis, sweating is not solely driven by thermoregulatory requirements but may also be triggered or exacerbated by emotional stimuli, physical activity, and environmental temperature. This pathophysiological mechanism provides the rationale for therapies targeting cholinergic neurotransmission. Botulinum toxin type A (BoNT-A) inhibits acetylcholine release from peripheral nerve terminals, including postganglionic sympathetic cholinergic fibers innervating eccrine sweat glands, thereby reducing sweat secretion in the treated area.^{1,2,8}

In the present case, the diagnosis of primary multifocal hyperhidrosis was supported by the characteristic clinical presentation, including onset at a young age, symptoms persisting for more than six months, bilateral and symmetrical involvement of the axillary, palmar, and plantar regions, recurrent episodes of excessive sweating, interference with daily activities, a positive family history, and cessation of excessive sweating during sleep.

Episodes were also exacerbated by physical activity, stress or anxiety, and hot weather. These features are consistent with established clinical criteria used to distinguish primary from secondary hyperhidrosis.^{3,6} Furthermore, no clinical or laboratory findings indicated an underlying systemic disorder or other identifiable secondary cause, supporting the diagnosis of primary multifocal hyperhidrosis.

The clinical burden of hyperhidrosis in pediatric patients extends beyond excessive sweating itself and may substantially affect functional and psychosocial well-being. In this patient, palmar hyperhidrosis interfered with writing because the paper frequently became wet, requiring the use of a cloth or tissue during school activities. The condition also reduced his self-confidence and negatively affected social interactions. Palmar and plantar hyperhidrosis may interfere with activities involving direct contact with the hands or feet and may lead patients to avoid handshakes, handling objects or electronic devices, and participation in social activities with peers.⁶ Therefore, disease severity in pediatric patients should be evaluated not only according to the extent of sweating but also according to its impact on daily functioning and quality of life.

In this case, the Hyperhidrosis Disease Severity Scale (HDSS) was used to assess the impact of hyperhidrosis on daily activities. The baseline HDSS score of 3 indicated sweating that was barely tolerable and frequently interfered with daily activities. The HDSS is a practical clinical assessment tool because hyperhidrosis is episodic and may not always be directly observed during examination. The Minor's iodine–starch test was additionally used to map the distribution of excessive sweating. Although this test does not quantitatively measure sweat production, it is useful for identifying the distribution and relative intensity of sweating, guiding BoNT-A injection sites, and documenting changes after treatment.⁶ In the present patient, the Minor's test was positive in the axillary, palmar, and plantar regions; however, the palms and soles were selected as the treatment sites because the palmoplantar symptoms had the greatest functional impact.

Treatment was selected using a stepwise and individualized approach based on the response to previous therapies. Topical aluminum salt–based antiperspirants are commonly used as first-line therapy because they are relatively inexpensive, readily available, and easy to apply. Their antiperspirant effect is primarily mediated by the formation of obstructive plugs within the sweat ducts, thereby reducing sweat delivery to the skin surface. Treatment efficacy may vary according to the anatomical site, and the thicker stratum corneum of the palms and soles may limit the effectiveness of topical therapy compared with areas of thinner skin.^{4,9} In this patient, aluminum chloride 15% for two months and 20% for one month provided inadequate symptom control. Aluminum chloride 35% was subsequently discontinued after three days because of local irritation, while aluminum chloride 25% was continued as maintenance therapy. The inadequate symptom control achieved with topical therapy prompted consideration of additional treatment modalities.

Systemic anticholinergic agents, such as oxybutynin, may be considered in patients with an inadequate response to topical therapy. In the present case, oxybutynin was considered but could not be administered because of limited drug availability, and iontophoresis was also unavailable. These limitations contributed to the decision to proceed with BoNT-A. Treatment selection for pediatric hyperhidrosis should be individualized according to age, affected sites, disease severity, functional and psychosocial burden, treatment tolerability, availability of therapeutic modalities, and patient and family preferences.^{4,5,10}

BoNT-A is a nonsurgical treatment option for focal hyperhidrosis that remains inadequately controlled with conservative therapy. Although BoNT-A is well established for the treatment of primary axillary hyperhidrosis in adults, its use for palmoplantar hyperhidrosis and in pediatric populations remains off-label. Evidence in children and adolescents remains limited and is derived primarily from case series, retrospective studies, and small observational studies. A previous case series involving adolescents aged 12–16 years reported the use of BoNT-A for idiopathic plantar hyperhidrosis following an inadequate response to antiperspirant therapy.¹¹ These findings provide support for considering BoNT-A in selected pediatric patients with persistent focal hyperhidrosis that causes substantial functional impairment.

In the present case, BoNT-A (Lanzox) was administered intradermally to the palms and soles at a total administered dose of 148 units. Each palm received 34 units distributed across 17 injection sites, whereas each sole received 40 units across 20 injection sites, with 2 units administered per site. Reported BoNT-A dosing regimens for palmoplantar hyperhidrosis vary considerably, and a standardized pediatric dosing regimen has not yet been established. Studies of palmar hyperhidrosis have used a broad range of doses, and higher doses have been reported in some studies to prolong the duration of anhidrosis; however, the relationship between dose and duration of effect is not necessarily linear.^{12,13} Accordingly, the dosing strategy in this patient was individualized according to the affected area, number of injection sites, and procedural tolerability.

A consistent BoNT-A concentration was used to ensure uniform dosing across injection sites. The 100-unit vial was reconstituted with 5 mL of 0.9% sodium chloride, whereas the 50-unit vial was reconstituted with 2.5 mL, resulting in the same concentration of 20 units/mL, equivalent to 2 units per 0.1 mL. The total volume

administered was 7.4 mL, corresponding to 148 units. Detailed reporting of the preparation, dilution, dose, and injection technique is particularly relevant in pediatric hyperhidrosis because dosing regimens vary across studies and no universally accepted pediatric dosing protocol has been established.^{6,7}

One of the major challenges associated with BoNT-A treatment of palmo-plantar hyperhidrosis is procedural pain due to the large number of injections and the high sensitivity of the palms and soles. Effective pain management is therefore particularly important in pediatric patients. Various analgesic approaches have been described, including topical anesthesia, cryoanalgesia, and regional nerve blocks.^{11,12} In this patient, topical anesthesia was applied for 30 minutes, followed by median and ulnar nerve blocks for palmar injections and posterior tibial and sural nerve blocks for plantar injections. This multimodal approach facilitated multiple intradermal injections with acceptable procedural tolerance. The only adverse event reported was transient local pain, and no systemic complications were observed.

Although hyperhidrosis was also demonstrated in the axillary regions, BoNT-A injections were limited to the palms and soles. This decision reflected the patient's treatment priorities rather than the anatomical distribution of the disease alone. Palmo-plantar hyperhidrosis caused the greatest interference with school activities and social interactions, and the patient elected to prioritize treatment of these areas while declining additional axillary injections because of concerns regarding procedural pain. This treatment decision highlights the importance of shared decision-making in pediatric hyperhidrosis, particularly when multiple anatomical sites are affected.

Treatment resulted in improvement in both patient-reported and clinically assessed outcomes. Four weeks after BoNT-A injection, the Minor's iodine-starch test demonstrated reductions in the extent and intensity of staining in the palmar and plantar regions. The HDSS score decreased from 3 at baseline to 1 at four weeks. These findings were accompanied by improvements in daily functioning, particularly the ability to write without requiring a cloth or tissue to absorb excess sweat, as well as improved self-confidence during social interactions. These findings are consistent with previous reports of BoNT-A treatment in pediatric hyperhidrosis demonstrating improvement in hyperhidrosis severity and quality of life.^{6,7}

The therapeutic effect of BoNT-A is temporary because cholinergic neurotransmission gradually recovers following chemodenervation. The duration of clinical benefit after BoNT-A injection for hyperhidrosis varies according to the anatomical site, dose, and individual patient characteristics and may persist for several months.^{12,13} In this patient, the clinical benefit was maintained throughout the six-month follow-up period. This relatively sustained response provided a clinically meaningful period of symptom control while also emphasizing the importance of periodic follow-up to determine the need for repeat treatment. Higher doses do not necessarily result in proportionally greater clinical benefit or patient satisfaction; therefore, decisions regarding retreatment and dose adjustment should remain individualized.⁸

Safety is an important consideration because the patient was an adolescent and the use of BoNT-A for nonaxillary hyperhidrosis in pediatric patients remains off-label. Available pediatric literature generally describes adverse events as local and transient, most commonly injection-site pain and, in some cases, mild temporary muscle weakness resulting from diffusion of the toxin into adjacent tissues.^{7,10} In the present case, no serious adverse events or systemic complications were observed during follow-up, and the only reported adverse event was transient local pain. Nevertheless, patients and their families should be counseled regarding potential adverse effects, the temporary nature of treatment, the possibility of repeat injections, and the procedural discomfort and costs associated with subsequent treatment.

This report has several limitations. As a single case report, the findings cannot be generalized to the broader pediatric population with primary hyperhidrosis. Furthermore, although the clinical benefit persisted throughout the six-month follow-up period, this duration is insufficient to evaluate long-term safety, recurrence, or the cumulative effects of repeated BoNT-A injections. Variability in BoNT-A preparations, dosing regimens, and injection techniques in pediatric patients also limits direct comparison with previous reports. Nevertheless, this case illustrates a practical, individualized approach to the management of an adolescent with primary multifocal hyperhidrosis, including clinical diagnosis, mapping with the Minor's iodine-starch test, escalation following inadequate response to topical therapy, targeted treatment of the most functionally affected sites, multimodal procedural analgesia, and assessment of treatment response using the HDSS and Minor's test. The case also highlights that successful management of pediatric hyperhidrosis should consider not only the reduction of excessive sweating but also improvements in daily functioning and psychosocial well-being.

Conclusion

Botulinum toxin type A (BoNT-A) may be considered a therapeutic option for pediatric patients with primary hyperhidrosis that causes substantial functional impairment and is inadequately controlled with topical therapy. In this case, intradermal BoNT-A (Lanzox), with a total administered dose of 148 units to the palmar and plantar regions, combined with topical anesthesia and regional nerve blocks, resulted in marked clinical improvement. At four weeks, the HDSS score decreased from 3 to 1, accompanied by reductions in the extent and intensity of staining on the Minor's iodine–starch test and improvement in daily functioning. The only reported adverse event was transient local pain, with no systemic complications. Clinical benefit was maintained throughout the six-month follow-up period. The use of BoNT-A in pediatric patients requires individualized treatment planning, appropriate counseling and informed consent from the parent or legal guardian, adequate procedural pain management, and regular follow-up to assess the duration of clinical benefit and the need for repeat treatment.

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