

CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Trauma, possible cause of localized unilateral hyperhidrosis of the face?

Olivera Levakov^{1,2}, Aleksandar Jovanović^{1,3}, Zoran Gajić^{1,4}, Tatjana Roš^{1,2}, Aleksandar Kopitović^{1,3}, Branislava Gajić^{1,2}, Ivan Levakov^{1,5}

¹Clinical Center of Vojvodina, Novi Sad, Serbia;

²University of Novi Sad, Faculty of Medicine, Department of Dermatology, Novi Sad, Serbia;

³University of Novi Sad, Faculty of Medicine, Department of Neurology, Novi Sad, Serbia;

⁴University of Novi Sad, Faculty of Medicine, Department of Psychiatry, Novi Sad, Serbia;

⁵University of Novi Sad, Faculty of Medicine, Department of Surgery, Novi Sad, Serbia



SUMMARY

Introduction Localized unilateral hyperhidrosis (LUH) is a rare disorder of unknown origin, with multiple possible triggering factors and unknown pathogenesis. Although there are cases of LUH of the face reported, this is the first to report isolated ipsilateral hyperhidrosis of the face after blunt force trauma.

Case outline A 54-year old Caucasian woman presented with facial LUH of five years' duration. Ipsilateral blunt trauma of the temple that preceded the condition for three months was identified as the most probable cause. For sharp demarcation, the Minor's or starch-iodine test was performed, which revealed the presence and extent of the facial sweating on the left side of the face. Treatment with 20% aluminium chloride hexahydrate sol. (Retrargin sol.) was conducted with partial response.

Conclusion After ruling out underlying diseases as a cause of LUH, a prior trauma should be considered as a potential cause. The possible mechanism could be the lesion of sympathetic chain as a result of cervical traction due to a facial blunt force trauma, although it cannot be positively proven.

Keywords: hyperhidrosis; trauma; unilateral

INTRODUCTION

Localized unilateral hyperhidrosis (LUH) is a rare disorder of unknown origin, with multiple possible triggering factors. LUH is usually located on the forehead or the forearm, characterized by sharply demarcated area of hyperhidrosis, and is secondary in nature. The pathogenesis of LUH remains unclear [1]. Although there are cases of LUH of the face reported, to our knowledge this is the first report of isolated ipsilateral hyperhidrosis of the face after blunt force trauma [2, 3, 4].

CASE REPORT

A 54-year old Caucasian woman presented with a five-year history of hyperhidrosis localized to the left side of the face. Ipsilateral blunt assault trauma of the temple caused by a closed fist strike to the face preceded the condition by three months. The patient was admitted with soft tissue injury only, with significant hematoma and swelling, but no fracture. No treatment was required at the time. The hyperhidrosis is aggravated by physical exercise, but unaffected by emotional triggers, gustative stimuli, or environmental temperature changes.

For sharp demarcation, the Minor's or starch-iodine test is performed [5]. Liquid 10% iodine paint is applied to the skin of the

face and neck. Once dry, the area is dusted with corn starch. Sweating is provoked by getting the patient to squat repeatedly for two minutes. The violet-black spots in the starched area constitute a positive test, generated by the formation of iodine-starch complex on dissolution of starch by sweat. In this case, distinctive violet patches were visible on the left side of the face and neck mostly in the mental and infraorbital areas, confirming the presence and extent of the facial sweating (Figure 1).

Physical stimulation was continued for additional two minutes and multiple individual dots 0.5 to 1 mm in diameter appeared on the contralateral side, indicating an intact sweating mechanism, thus excluding anhidrosis of the contralateral side.

The patient's medical history included an eight-year history of hypertension, hyperlipidemia, and spondylosis of the cervical spine. Medications included metoprolol, cilazapril, hydrochlorothiazide, bromazepam, and fenofibrate. There was no history of gastrointestinal, urinary, or vascular disorders indicative of sympathetic nervous system dysfunction, including patterns of defecation and micturition, flushing and migraine headaches.

Physical examination revealed no abnormalities. Blood pressure and pulse rate were within the normal range. Full neurological examination including electrophysiological examination of the face was normal. Psychiatric evaluation

Received • Примљено:
November 9, 2018

Revised • Ревизија:
July 15, 2020

Accepted • Прихваћено:
September 9, 2020

Online first: September 30, 2020

Correspondence to:

Olivera LEVAKOV
Clinical Center of Vojvodina
Hajduk Veljkova 1-3
21000 Novi Sad, Serbia
olivera.levakov@mf.uns.ac.rs



Figure 1. Minor's iodine test, from the (a) profile and (b) straight on views; the starch powder is applied in a patient with localized unilateral hyperhidrosis

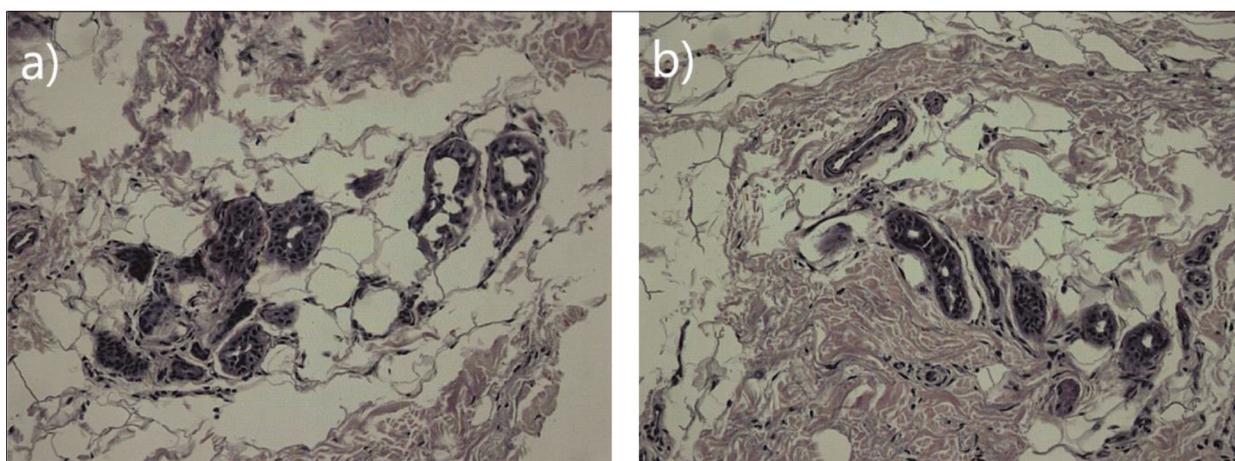


Figure 2. Histopathology of skin biopsies (H&E, 50x); (a) skin biopsy taken from the affected area of the skin and (b) contralateral unaffected area of the skin

revealed no signs of emotional or anxiety disorder. Results of laboratory tests were within normal limits. The computed tomography (CT) scan of the brain, neck, and chest was normal.

Skin biopsies were taken from the affected (Figure 2a) and contralateral unaffected (Figure 2b) areas of the skin.

The histopathology showed the normal number and structure of the eccrine glands, although the diameter of the eccrine duct lumen from the affected area was increased compared to the unaffected side, still within the normal range. These results excluded an eccrine nevus lesion.

Treatment with daily application of 20% solution of aluminium chloride hexahydrate on the affected area was conducted for five days per week for four weeks and maintained as a three days per week regiment with partial response.

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

DISCUSSION

LUH is an uncommon condition. The hyperhidrotic area is usually sharply demarcated and measures no more than 10×10 cm, and lesions have mostly been reported on the face or forearm of healthy individuals. The reported age of onset varies between seven and 67 years and bouts occur more frequently in the summer than in the winter months. Rarely, LUH is accompanied by contralateral anhidrosis, when hyperhidrosis is generally thought to be compensatory [1]. Pathogenesis of LUH is unclear. Various underlying disorders have been associated with LUH, such as Frey's syndrome, cerebral infarction, Buerger disease, Holmes-Adie syndrome, intra-thoracic malignancies, Riley-Day syndrome, LUH secondary to an eccrine nevus and type 1 neurofibromatosis [6]. As reported by some authors, it can be secondary to trauma or idiopathic [2, 6–11].

Clinical signs of hyperhidrosis are usually visible and Minor's or iodine-starch test is helpful in demarcating the areas of localized hyperhidrosis.

The exact neural pathways of sweating regulated by the autonomic nervous system in humans are not entirely identified and understood. Efferent signals from the primary thermoregulatory center located in the pre-optic hypothalamic regions of the brain travel via the pontine tegmentum and the medullary raphe regions to the intermediolateral cell column of the spinal cord. Neurons from the ventral horn pass through the *ramus communicans*, combine with peripheral nerves, and travel to sweat glands. In addition, there is also an inhibitory bundle that goes from the frontal operculum, whose lesion at any level can cause hyperhidrosis. Sympathetic system is also responsible for sweating. Sympathetic nerves arise from the intermediolateral nucleus of the lateral grey column, beginning at the first thoracic vertebra of the vertebral column and extend to the second or third lumbar vertebra (Th1–L2, L3). The axons of these neurons travel through the anterior horns and anterior roots of spinal nerves to the sympathetic chain. Cord transection abolishes the supraspinal control of sudomotor function. If someone has impaired sweating above the waist affecting only one side of the body, the lesion is most probably just below the stellate ganglion in the sympathetic chain. The stellate ganglion is located at the level of the seventh cervical vertebrae (C7), anterior to the transverse process of C7, superior to the neck of the first rib, and just below the subclavian artery. Therefore, impaired sweating of the face would probably be due to a lesion of the sympathetic chain at C7–Th1 level [12].

In our case, we speculated that left-sided facial assault injury caused cervical traction (a sort of whiplash injury) in which sympathetic chain was injured, leading to hypohidrosis of the contralateral side (instead of expected anhidrosis) and compensatory hyperhidrosis of the ipsilateral side. Although anhidrosis was clearly excluded by performed tests, hypohidrosis, as a result of partial sympathetic chain lesion (complete transection was never considered for lacking of other symptoms, most prominently Horner's syndrome), could occur with compensatory hyperhidrosis on the side of the trauma, which was the most prominent symptom. Blunt force type of trauma suffered by our patient is known to produce injury of the cervical spine and corresponding structures on both sides. Considering other possible explanations, we must mention Frey's syndrome, in which we have misdirected reconnection of sectioned postganglionic secretomotor parasympathetic fibers, which normally innervate the parotid gland to sympathetic receptors, which in turn innervate sweat glands. This results in gustatory sweating. This cannot be an explanation for our case, as in Frey's syndrome "sweating" of the face is exclusively provoked by gustatory stimuli (for example drinking lemon juice), which did not occur in our patient, who had hyperhidrosis continuously [5, 13]. Our patient also did not fulfill criteria for Ross syndrome, a rare condition which consists of Adie's syndrome (myotonic pupils and absent deep tendon reflexes) and segmental anhidrosis typically associated with compensatory hyperhidrosis [14]. A few reported cases were associated with an underlying intrathoracic neoplasm, which has been excluded by thoracic CT scan [1]. It is recorded that

strokes affecting the contralateral cerebral hemisphere or its descending connections can result in contralateral hyperhidrosis [15]. However, there are no reasons to believe that our patient had a concomitant stroke. Finally, we must consider a lesion of the peripheral sudomotor nerve fibers. As it was mentioned before, the sudomotor and vasomotor fibers to most of the face separate out at the superior cervical ganglion and anhidrosis or hypohidrosis is often not noticeable in postganglionic lesions. A lesion of local cutaneous small nerve fibers could produce anhidrosis or hypohidrosis on the site of trauma, but the patient had hyperhidrosis on the side of trauma, so this explanation is not applicable and we have to exclude it [12].

LUH can also be associated with emotional or anxiety disorders, and the intensity of symptoms is reported to become tolerable after full de-stress of the patient [16]. In our patient, this etiology was excluded by psychiatric evaluation and follow-up.

There are few reports demonstrating the presence of enlarged sweat glands in the affected skin of patients with localized hyperhidrosis and the lesions have been considered as variants of the pure anatomical eccrine nevi or as functional nevi which showed secondary hypertrophy of the glandular elements, but skin biopsies in our patient failed to reveal such findings [1].

There are no consensus-based criteria for establishing the diagnosis of trauma-based hyperhidrosis, apart for anamnestic data and exclusion of other possible causes of hyperhidrosis or compensatory hyperhidrosis.

There is no standardized therapy for LUH. Treatments are divided into those that work locally on either sweat gland function or on the nervous system that supplies them, and systemic therapy with anticholinergic and anxiolytic drugs. Topical treatment (acids, aldehydes, glycopyrrolate, metal salts e.g. aluminium chloride) is the first choice for localized hyperhidrosis. Botulinum toxin, microwave thermolysis (*miraDry*®), iontophoresis, systemic medications (anticholinergic and anxiolytic drugs) should be administered if topical treatment is not sufficient or not applicable [17]. Endoscopic thoracic sympathectomy has serious side effects, including compensatory sweating. Considering adverse effects of surgery and systemic therapy, local application of aluminium chloride hexahydrate by the patient is economically acceptable, has satisfactory results, and is a convenient treatment modality [5, 17]. The mechanism of action is postulated to be the induction of eccrine secretory gland atrophy secondary to long-term mechanical obstruction of sweat gland pores by the aluminium salts [5].

The most efficient treatment, with no or few side effects is 6–9 monthly repeated injections of botulinum toxin A, but the cost of this treatment is significant. Medicolegal implications of diagnosing a trauma-caused (compensatory) hyperhidrosis are thus very important. This is one more reason to take a multidisciplinary approach when diagnosing and treating LUH.

CONCLUSION

The approach to a patient with LUH is complex and multidisciplinary. After ruling out an underlying disease, a prior trauma, if present, must be considered as a potential cause. As a possible mechanism of trauma causing LUH

in our patient we postulate the lesion of the sympathetic chain induced by a cervical traction after an ipsilateral blunt-assault facial trauma.

Conflict of interest: None declared.

REFERENCES

- Kocyigit P, Akay BN, Saral S. Unilateral hyperhidrosis with accompanying contralateral anhidrosis. *Clin Exp Dermatol.* 2009;34(8):e544–6.
- Oliveira Lima GL, Brandao Camara RL. Isolated hemifacial hyperhidrosis after axis gunshot fracture. *Spine J.* 2016;16(6):e365.
- Satoshi I, Yoko I, Naoki N, Maki S, Junichi S. Hemifacial hyperhidrosis associated with ipsilateral/contralateral cervical disc herniation myelopathy. Functional considerations on how compression pattern determines the laterality. *Funct Neurol.* 2014;29(1):67–73.
- Sarikaya H. Hemifacial sweating after carotid artery dissection. *Lancet.* 2011;378(9791):606.
- Samson NG, Torjek C, Hovan A. Management of Frey Syndrome Using Botulinum Neurotoxin: A case report. *JCDA.* 2009;75(9):651–4.
- Kashyap P, Yadalla HK, Vivakand DVL. Hyperhidrosis – A Review on Idiopathic Unilateral Circumscribed Hyperhidrosis. *Arch Dermatol.* 2018;1(1):21–5.
- Eren Y, Yavasoglu NG, Comoglu SS. Post-traumatic unilateral plantar hyperhidrosis. *Clin Auton Res.* 2016;26(1):75–7.
- Yadalla HK, Ambika H, Chawla S. A case of idiopathic unilateral circumscribed hyperhidrosis. *Indian J Dermatol.* 2013;58(2):163.
- Kreyden OP, Schmid-Grendelmeier P, Burg G. Idiopathic localized unilateral hyperhidrosis: case report of successful treatment with botulinum toxin type A and review of the literature. *Arch Dermatol.* 2001;137(12):1622–5.
- Thorlacius L, Debes NM, Zachariae C, Kofoed K. Idiopathic localized unilateral hyperhidrosis in a 7-year-old girl: a case report. *Acta Derm Venereol.* 2015;95(3):364–5.
- Ghali FE, Fine JD. Idiopathic localized unilateral hyperhidrosis in a child. *Pediatr Dermatol.* 2000;17(1):25–8.
- Kardon R. Anatomy and physiology of the autonomic nervous system. In: Miller NR, Newman NJ, Biouesse V, Kerrison JB, editors. *Walsh and Hoyt Clinical Neuro-ophthalmology*, 6th ed. Baltimore: Williams & Wilkins; 2005. p. 649.
- Kamath RA, Bharani S, Prabhakar S. Frey's syndrome consequent to an unusual pattern of temporomandibular joint dislocation: case report with review of its incidence and etiology. *Craniofacial Trauma Reconstr.* 2013;6(1):1–8.
- Weller M, Wilhelm H, Sommer N, Dichgans J, Wiethölter H. Tonic pupil, areflexia, and segmental anhidrosis: two additional cases of Ross syndrome and review of the literature. *J Neurol.* 1992;239(4):231–4.
- Minota K, Coon EA, Benarroch EE. Neurologic aspects of sweating and its disorders. *Neurology.* 2019;92(21):999–1005. Erratum in: *Neurology.* 2020;94(4):187.
- Ghorpade VA. Idiopathic unilateral focal hyperhidrosis with social anxiety disorder. *Indian J Psychiatry.* 2009;51(3):214–5.
- Rysted A, Brismar K, Aquilonius SM, Naver H, Swartling C. Hyperhidrosis – an unknown widespread “silent” disorder. *J Neurol Neurosurg Psychiatry.* 2016;1(4):25–33.

Повреда као узрок локализоване унилатералне хиперхидрозе лица?

Оливера Леваков^{1,2}, Александар Јовановић^{1,3}, Зоран Гајић^{1,4}, Татјана Рош^{1,2}, Александар Копитовић^{1,3}, Бранислава Гајић^{1,2}, Иван Леваков^{1,5}

¹Клинички центар Војводине, Нови Сад, Србија;

²Универзитет у Новом Саду, Медицински факултет, Катедра за дерматовенерологију, Нови Сад, Србија;

³Универзитет у Новом Саду, Медицински факултет, Катедра за неурологију, Нови Сад, Србија;

⁴Универзитет у Новом Саду, Медицински факултет, Катедра за психијатрију, Нови Сад, Србија;

⁵Универзитет у Новом Саду, Медицински факултет, Катедра за хирургију, Нови Сад, Србија

САЖЕТАК

Увод Локализована унилатерална хиперхидроза (ЛУХ) ре-дак је поремећај непознате етиологије, са многобројним могућим окидајућим факторима, непознате патогенезе. Иако постоје описани случајеви ЛУХ лица, ово је први који илуструје изоловану ипсилатералну хиперхидрозу лица после физичке трауме.

Приказ болесника Приказана је болесница стара 54 године са локализованом унилатералном хиперхидрозом лица која траје пет година уназад. Туп ударац у леву слепоочницу који је три месеца претходило поремећају је идентификован као могући узрок ипсилатералне хиперхидрозе. За јасну

демаркацију коришћен је Миноров или тест „јод–скроб“, којим је утврђено прекомерно знојење леве стране лица. Сprovedена је терапија 20% раствором алуминијум-хлорид-хексахидрата (Петрагин) са делимичним терапијским одговором.

Закључак После искључења евентуалних постојећих обољења као узрока ЛУХ, трауму која је претходила би требало посматрати као могући узрок. Могући механизам настанка је тракција цервикалне кичме узрокована ударцем у лице и последица лезија симпатичког ланца, иако се наведена тврдња не може са сигурношћу доказати.

Кључне речи: хиперхидроза; траума; унилатерална