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**Case Report / Приказ болесника**

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

Повреда као узрок локализоване унилатералне хиперхидрозе лица?

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

### Повреда као узрок локализоване унилатералне хиперхидрозе лица?

#### 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 localized unilateral facial hyperhidrosis (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 or „starch-iodine“ test is performed which revealed presence and extent of the facial sweating on the left side of the face. Treatment with Sol. 20% aluminium chloride hexahydrate (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

#### САЖЕТАК

**Увод** Локализована унилатерална хиперхидроза (ЛУХ) је редак поремећај непознате етиологије, са многобројним потенцијалним окидајућим факторима, непознате патогенезе. Иако постоје описани случајеви ЛУХ лица, ово је први који илуструје изоловану ипсилатералну хиперхидрозу лица након физичке трауме.

**Приказ случаја** Пацијенткиња старе 54 године са локализованом унилатералном хиперхидрозом лица која траје пет година уназад. Тупи ударац у леву слепоочницу који је три месеца претходио поремећају је идентификован као могући узрок ипсилатералне хиперхидрозе. За јасну демаркацију је употребљен *Minor's Sweat Test* или „јод-скроб тест“, којим је утврђено прекомерно знојење леве стране лица. Сprovedена је терапија 20% раствором алуминијум хлорид хексахидрата (Ретраргин) са делимичним терапијским одговором.

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

**Кључне речи:** хиперхидроза; траума; унилатерална

#### 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 [2,3,4], this is the first to report isolated ipsilateral hyperhidrosis of the face after blunt force trauma.

## 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 closed fist strike to the face preceded the condition by three months. 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 or gustative stimuli or environmental temperature change.

For sharp demarcation the Minor's or „starch-iodine“ test is performed [5]. Liquid 10% iodine paint is applied to the skin of face and neck. Once dry, the area was dusted with corn starch. Sweating is provoked by getting the patient to squat repeatedly for 2 minutes. The violet-black spots in the starched area constituted 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 further 2 minutes and multiple individual dots 0.5 to 1 mm appeared on the contralateral side, indicating an intact sweating mechanism, and thus anhidrosis of the contralateral side is excluded.

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

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

The histopathology showed 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 normal range. These results excluded an eccrine nevoid lesion.

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

Localized unilateral hyperhidrosis (LUH) is an uncommon condition. The hyperhidrotic area is usually sharply demarcated and measures no larger than 10x10 cm, and lesions have mostly been reported on the face or forearm of healthy individuals. The reported age of onset varies between 7 and 67 years and the attacks occur more frequently in the summer than in the winter months. Rarely LUH is accompanied by contralateral anhidrosis [1] in which cases the hyperhidrosis is generally thought to be compensatory. Pathogenesis of LUH is unclear. Various underlying disorders were associated with LUH such as Frey's syndrome, cerebral infarction, Buerger disease, Holmes-Adiesyndrome, 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 [2,7,8,9] or idiopathic [10,6,11].

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. Besides that, 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. Stellate ganglion is located at the level of C7 (7th cervical vertebrae), 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 secret motor parasympathetic fibers which normally innervate the parotid gland to sympathetic receptors, which 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 a lemon juice) [5,13], which did not occur in our patient, who had hyperhidrosis continuously. 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 [1], which has been excluded by thoracic CT scan. It is recorded that strokes affecting the contralateral cerebral hemisphere or its descending connections can result with contralateral hyperhidrosis [15]. However, there

are no any reasons to believe that our patient had concomitant stroke. Finally, we must consider 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. 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 doesn't work and we have to exclude it [12].

Localized unilateral hyperhidrosis can also be associated with emotional or anxiety disorders, and intensity of symptoms are 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 a functional nevi which showed secondary hypertrophy of the glandular elements [1] but skin biopsies in our patient failed to reveal such findings.

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 which supplies them, and systemic therapy with anticholinergic and anxyolytic drugs. Topical treatment (acids, aldehydes, glycopyrrolate, metal salts eg aluminium chloride) is the first choice for localized hyperhidrosis. Botulinum toxin, microwave thermolysis (miraDry®), iontophoresis, systemic medications (anticholinergic and anxyolytic drugs) should be administered if topical treatment is not sufficient or not applicable [17]. Endoscopic Thoracic Sympathectomy (ETS) 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, satisfactory, and 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 multidisciplinary approach when diagnosing and treating LUH.

The approach to a patient with LUH is complex and multidisciplinary. After ruling out 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 sympathetic chain induced by cervical traction after ipsilateral blunt assault facial trauma.

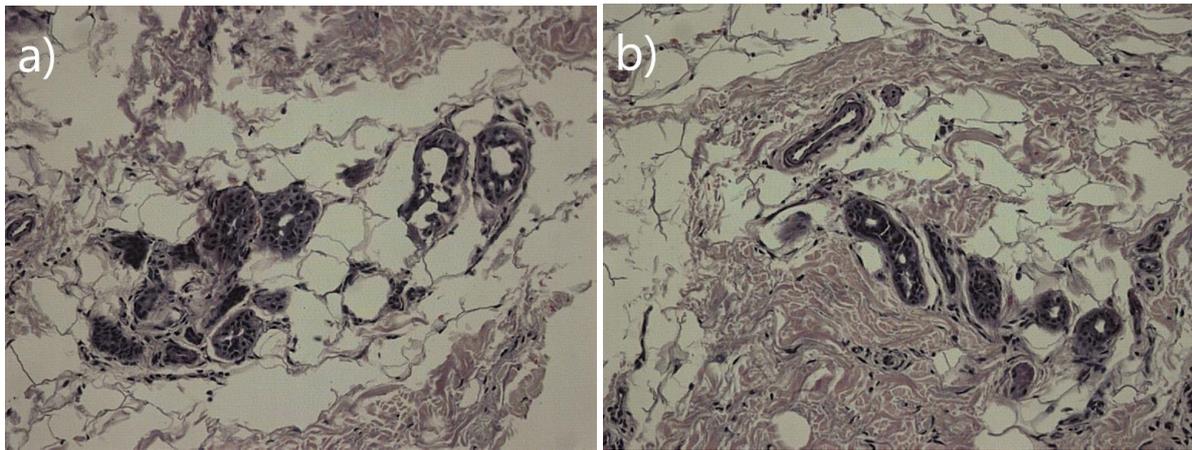
**Conflict of interest:** None declared.

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**Figure 1.** Minor's iodine test, from the (a) profile and (b) straight on views; the starch powder is applied in patient with localized unilateral hyperhidrosis; written informed consent was obtained from the patient for publication of this case report and any accompanying images



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

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