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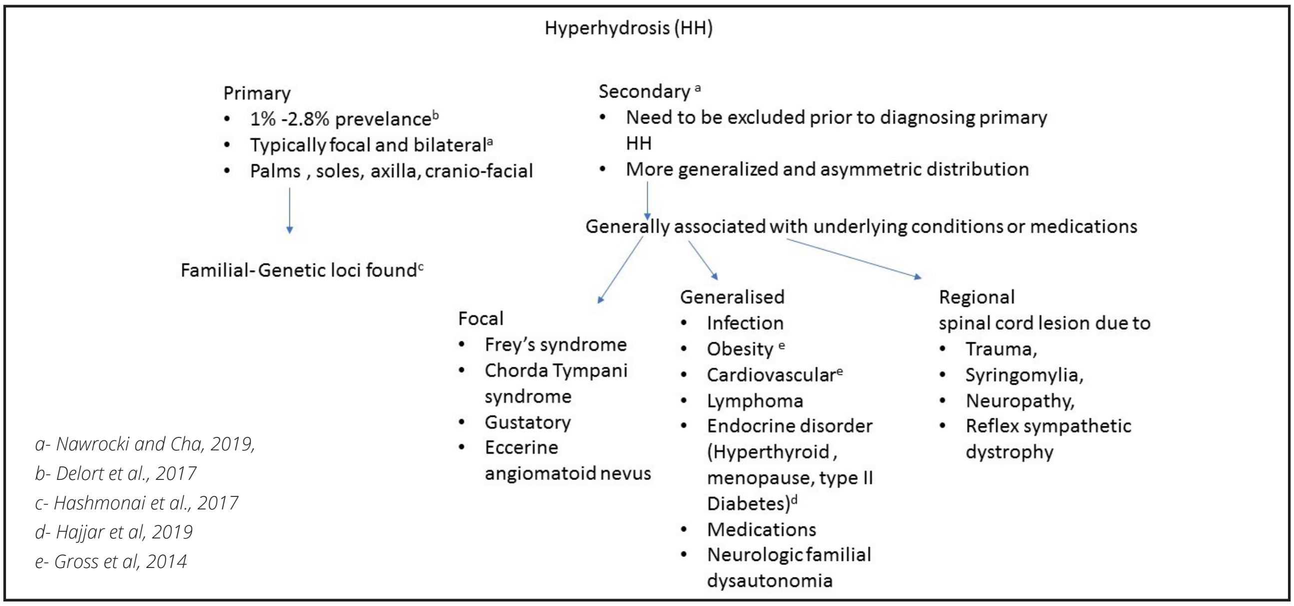
# MOP YOUR BROW

## Dr Bhavjit Kaur explores the protocols for diagnosing and treating face, neck and scalp hyperhidrosis with botulinum toxin injections

Hyperhidrosis (HH) is a functional disorder where there is disproportionately excessive sweating, greater than the physiological needs to regulate body temperature *(Hajjar et al, 2019)*. The central nervous system (cortex, hypothalamus, medulla) and sweat glands, including the eccrine, apocrine, and apo-eccrine, are involved in the physiopathology HH *(Hexsel and Camozzato, 2018)*.

The incidence of hyperhidrosis is reported as being approximately 1% of the population in the UK *(Fung et al, 2010)*. Out of all hyperhidrosis cases, 22.8% suffer from craniofacial hyperhidrosis (CFH) - scalp, nape of neck, forehead, nose, cheek and upper lip *(Nicholas et al, 2015)*. The greatest prevalence rate is between age 18 and 54 *(Nicholas et al, 2015)*. HH manifests itself more frequently in more than one site *(Estevan et al, 2017)* and facial hyperhidrosis can lead to serious emotional distress *(Wolosker et al, 2014)*. CFH has a deeply negative impact on the quality of life *(Hajjar et al, 2019, Lin and Fang, 2000, Nicholas et al, 2015)* and may even result in isolation because of social phobia *(Lin and Fang, 2000, Nicholas et al, 2015)*. HH can be perceived as being non-hygienic and cause emotional distress *(Hajjar et al, 2019)*.



## HH severity

The **Dermatology Life Quality Index (DLQI)** and **The Hyperhidrosis Disease Severity Scale (HDSS)** are used to qualitatively measure the severity of HH based on how it interferes with everyday events *(Kowalski et al, 2004, NICE 2017).*

For the HDSS, the patient is asked one question: "*How would you rate the severity of your hyperhidrosis?*" with four possible answers scored (1-4):

1. My sweating is never noticeable and never interferes with my daily activities
2. My sweating is tolerable but sometimes interferes with my daily activities
3. My sweating is barely tolerable and frequently interferes with my daily activities
4. My sweating is intolerable and always interferes with my daily activities

A score of 3 or 4 indicates severe hyperhidrosis. A score of 1 or 2 indicates mild or moderate hyperhidrosis.

## Medical history

It is essential to be certain that the reason for HH is primary and focal and that treatment is essential. HH should be noted for more than 6 months with no obvious underlying condition, and have at least two of the following criteria *(Lakhraj et al, 2013)*:

- Bilateral and fairly symmetrical
- Interferes with daily activities
- At least one weekly episode
- Onset was before the age of 25
- Family history is positive
- Terminates during sleep

Medical history should also include the volume of sweating, the total number of areas involved in sweating, and whether there are any emotional triggers. You should rule out any underlying secondary causes by asking about fever, weight loss, loss of appetite, headache, vomiting, abdominal pain, headache and palpitations.

## Physical examination

Visible signs of HH are often very evident, but if it is not obvious then the Minor starch-iodine test can be used. It is a useful method to find out the focal areas of hyperactive sweat glands, can be used to compare the effect of the treatment and also limits the extent of treatments. I used to do this test regularly, but I am not using it anymore as it does not provide a precise, objective measurement of the degree of sweating *(Nicholas et al, 2015)* and in my opinion, it is aesthetically unacceptable for CFH.

## Investigations

If there are suspicions after history taking that the HH is more generalised, then it is better to refer the patient to the GP or appropriate consultant. The investigations may include laboratory studies like thyroid function tests, blood glucose levels, urinary catecholamines, uric acid, chest X-rays and biopsy *(Shwartz et al 2019)*.

## Treatment of HH

*Nicholas et al, 2015* recommend topical glycopyrrolate, oral oxybutynin and intradermal botulinum toxin injection as the first line of treatment for patients suffering from primary hyperhidrosis *(Hajjar et al, 2019)*. (NB: some of the options are not feasible for CFH).

- **Topical products (aluminium compounds)**
- **Iontophoresis**
- **Oral**
  - Anticholinergic agents (glycopyrrolate, clonidine, oxybutynin)
  - Beta-blockers
  - Alpha-2 adrenergic agonists (clonidine)
- **Interventional**
  - Botulinum toxin by dermal injections or by jet nebuliser
  - Sweat gland removal (suction or curettage)
  - Microfocused ultrasound
  - miraDry
  - Nd:YAG laser
- **Surgical**
  - Endoscopic transthoracic sympathectomy or its variations, if the patients do not respond to first line of treatments *(Nicholas et al, 2015)*

*Treatment options data collected from (Hexsel and Camozzaro, 2018, Licht 2016)*

The surgery is often associated with high rates of awkward compensatory sweating *(Adis Medical writers, 2016).*

Bushara and Park, in 1994 first reported the use of botulinum toxin for the treatment of hyperhidrosis and incidentally they first observed it on the face *(Connolly and Berker, 2003).*

## Craniofacial HH and botulinum toxin

**Mechanism of action of Botulinum toxin** - by chemo-denervation of the sweat glands by inhibiting the release of acetylcholine from the presynaptic motor neuron. And the effect stays for 5-6 months on an average *(Nicholas et al , 2015)*, or up to 8 months. Injected intradermally, botulinum toxin inhibits the release of acetylcholine at the neuromuscular junction from cholinergic fibres, reducing sweat production from eccrine glands.

**Dilution and dosage** – 5ml of saline per 100 unit botulinum toxin (BOTOX®) thereby 2.0 units per 0.1cc .

**Anaesthesia** – Topical LMX4 or Lidocaine *(Gulec, 2012)*. My personal preference is LMX4.

**Injection technique** – Injections should be intradermal or deep dermal but should not reach the underlying muscles, blanching should be observed at the injection site *(Glaser et al, 2007)*. I personally use a 30-gauge, 0.3ml BD insulin needle. The needle is introduced bevel up, at a 45-degree angle and approximately 2mm into the dermis *(Doft et al, 2012).*

Caution must be taken to treat aesthetically and equally on both sides of the face to maintain symmetry. Sometimes it is better to call the patient back after 4 weeks to top-up, if needed. We must also keep in mind the risk of neutralising antibodies due to repeat treatments at short intervals and cumulative higher dosage of toxin *(Naumann, Boo et al, 2012)*. When treating the forehead for example, it may be a good idea to treat the frontalis muscle and the glabellar muscles to maintain height and symmetry of the eyebrows. Peri-oral treatment could cause elongation of the upper lip, asymmetry of the smile, dribbling and other local muscle weakness related issues. Treatment of peri-oral lines would also be targeted with the peri-oral treatment for HH. Whilst treating the nose, maintaining symmetry is important; bunny lines and nasal flaring could be targeted, if present.

## Possible side effects

- Pain
- Bruising/Erythema at Injection Site
- Swelling
- Headache
- Local paraesthesia
- Malaise
- Asymmetrical eyebrow
- Eyebrow/Eyelid ptosis
- Ectropion, Scleral Show, Lid Oedema, Lagophthalmos *(Ozgur et al, 2012)*
- Diplopia
- Dryness of eyes *(Ozgur et al, 2012)*
- Oral incompetence

## Treatment protocol >>

| Area | Units per injection site | Distance between injections | Average total dose |
|---|---|---|---|
| Scalp | 1-2 U | 1.5-2 cm | 200 U |
| Scalp and forehead[a] | 2-2.5 U | 2 cm | 300 U |
| Anterior scalp and forehead | Scalp-1-2<br>Forehead-0.5-1U | 1.5-2 cm | 100 U |
| Upper lip | 0.5U | 1-1.5 cm | 3-5 U |
| Nose[a] | 1-2 U | 1 cm | 10-20 U |
| Chin | 1-2 U | 1 cm | 8-10 U |
| Cheeks | 1-2 U | 1-1.5 cm | 10-15U each side or depending on the area involved. |

[a] *Glaser and Galperin, 2014*

## Contraindications

*(Doft et al, 2012)*

- Pregnant and breastfeeding women
- If there is a secondary cause of hyperhidrosis
- If the sweat glands have been surgically removed
- Severe blood clotting disorders
- Infection at site of injection or systemic infection at the time of treatment.
- History of neuromuscular disease-myasthenia gravis, Eaton-Lambert syndrome, or amyotrophic lateral sclerosis.

## Summary

Intradermal injections of botulinum toxin is a very effective treatment for HH. Patient satisfaction after botulinum toxin treatment for HH is high for all body parts prone to sweating *(Naumann et al, 2002)*.

The average dose of botulinum toxin used during the treatment depends on the area of HH.

Personally, I feel that scalp, forehead, or focal spots on the cheek, upper lip or nose are better tolerated than a full-face treatment. A full-face treatment was very painful for my patients, especially with subepidermal injections which are close to 'free nerve endings' *(Vadoud-Seyedi et al, 2001)* and in my patients' words "*not worth the pain*". If I do need to do full face treatment again then I would probably add lidocaine.

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