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Axillary Hyperhidrosis Surgical Treatment among Patients in Saudi Arabia

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Abstract

Primary hyperhidrosis is a condition of sweating in excess of thermoregulatory requirements and carries significant emotional and psychosocial implications. Unlike secondary hyperhidrosis which may be caused by endocrine disorders, primary hyperhidrosis is not associated with an identifiable underlying pathology. Our understanding of the precise pathophysiologic mechanism for hyperhidrosis makes its treatment particularly frustrating. However, wide arrays of interventions for the treatment of hyperhidrosis have been implemented throughout the world. In this, we discuss the most extensively studied therapeutic options for hyperhidrosis, including Sympatholytics, anxiolytics, sedatives, botulinum toxin injections, skin excision, liposuction–curettage, and sympathectomy. The purpose of this study is to describe the current techniques of removal of axillary Hyperhidrosis, and evaluate its efficacy and safety.

Keywords: *Primary Hyperhidrosis; Secondary Hyperhidrosis; Botulinum Toxin; Surgery*

Introduction

Hyperhidrosis is a typical, underdiagnosed and undertreated sickness. It is described by the emission of sweat that surpasses the typical physiological needs of the body so as to standardize body temperature, and may essentially trade off the personal satisfaction of influenced patients [1,2]. Studies on quality of life uncover that the adverse impacts of hyperhidrosis are equivalent to those of conditions, for example, extreme psoriasis, rheumatoid arthritis, end- stage renal failure and numerous sclerosis [3]. Primary hyperhidrosis is intemperate uncontrollable sweating with no noticeable reason. It most ordinarily includes the axillae, palms, and soles yet may likewise include the face and crotch [4]. Auxiliary hyperhidrosis might be caused by endocrine issue (e.g. hyperthyroidism), secretory tumors (e.g. pheochromocytoma), thoughtful nervous system issue, or essential neurologic or psychiatric disorders.

Axillary hyperhidrosis is unknown but is related to increased cholinergic sympathetic stimulation of the sweat glands in the axilla. Despite the fact that the organs perpetually turn out to be surprisingly hypertrophied in this condition, the sensational glandular devel-

opment and over secretion is accepted to be secondary as opposed to primary; a parallel idea is oxyntic cell hypertrophy in peptic ulcer ailment because of vagal hypertonicity. The watched atrophy of sweat glands in grafted skin, with return of sweating with re-innervation, prompted the theoretical connection between sympathetic tone and acinar hypersecretion. Additional proof of the neural control of sweat creation originates from the perception that local analgesic infusion briefly stops hypersecretion of sweat as cholinergic bar from local infusion of botulinum toxin [5]. While axillary hyperhidrosis quite often starts with pubescence, no direct hormonal association has been recommended. A few related axillary conditions might be mistaken for hyperhidrosis. Axillary bromidrosis (or osmidrosis) is chronic offensive axillary smell; it might be identified with apocrine secretions and to chronic bacterial colonization (especially with diphtheroids and micrococci), and antibiotic usage might be oppressive or curative. Axillary lymphadenitis is the irritation and amplification of underarm lymph hubs. An axillary breast is the presence in the axilla of subcutaneous breast tissue with or without a nipple.

Bisbal., *et al*. [6] have validated that eccrine and apocrine sweat glands are mixed in the axilla, with a proportion of 1:1. In patients with axillary hyperhidrosis, Morgan and Hughes [7] validated that the apocrine glands are expressively larger and more numerous than those in axillary hidradenitis and in healthy control subjects. Subsequent a comprehensive resection of the subcutaneous axillary sweat glands (Skoog procedure), a small number of eccrine glands remain and nearly no apocrine glands could be found. Therefore it seems that a Skoog adenectomy is fundamentally an apocrinectomy. This is at odds with the observation that the profuse sweat created in axillary hyperhidrosis (and stopped by Skoog resection) is clear and odorless; typically, apocrine sweat is defined as cloudy and odoriferous, though eccrine sweat is labeled clear and without odor. No one has acquiescent these seeming inconsistencies, but the interpretation is that the clear, odorless, profuse sweating witnessed in axillary hyperhidrosis comes from the hypertrophied and intense apocrine glands.

Treatment of Axillary Hyperhidrosis

Heckmann., *et al*. [8] have depicted a gravimetric strategy for quantitating sweat creation in which channel paper is measured dry on a high-exactness lab scale, at that point put in contact with a hyperhidrotic range of patient skin for 60 seconds, at that point weighed once more. They found the rate of sweat generation in hyperhidrotic ranges to be close to 200 mg/min.

Minor's iodine starch test has been utilized for a long time to outline territories of axillary hypersecretion [9]. The axilla is dried completely, painted with an iodine tincture, and then air-dried (Figure 1).

Figure 1: *Iodine/starch test for surgical treatment of axillary hyperhidrosis.*

Identification of axillary hyperhidrosis is essentially from patient history and from noticeable signs of extreme sweating. No valuable formal staging or severity scale occurs, but the terms mild, moderate, and severe are used in some clinical descriptions. Laboratory testing might have a critical role in eliminating secondary hyperhidrosis from causes such as hyperthyroidism, pheochromocytoma, carcinoid or other malignancy, tuberculosis, or adrenal pathology, especially in patients with asymmetric, late, or atypical onset of symptoms.

Medical Therapy

Medical treatments keen to reduce sympathetic stimulation, block sweat gland openings, or create neuro-acinar blockade.

Iontophoresis

Faucet water iontophoresis is a genuinely viable treatment in palmoplantar hyperhidrosis however is more unwieldy and less compelling in axillary hyperhidrosis. In this technique, dampened wipes wrapped around metal cathodes are embedded into every axilla for 20 minutes, and a low-voltage current is connected to the skin a few times each week; it delivers a stinging sensation. Unfavorable impacts of this technique are uneasiness with consuming, shivering, and skin disturbance, including erythema and vesicle arrangement. Inaccurate utilize might prompt iontophoretic consumes at destinations of minor skin damage. An ordinarily promoted mark name is the Drionics gadget. The component by which iontophoresis creates its sweat-diminishing impact is obscure [10,11].

Radiation

Low dose topical radiation creates in any event transient abatement in nearby sweat generation and has been proposed as a treatment for hyperhidrosis. Postradiation decay of the axillary sweat organ layer can be illustrated. Be that as it may, potential genuine late unfriendly impacts of radiotherapy make this a methodology that can't be prescribed as a practical answer for hyperhidrosis [12].

Dietary restriction

Meanwhile hyperhidrosis of all kinds may be exacerbated by stimulant-containing foods, particularly caffeine and theobromine, dietary restriction of coffee, tea, cola soft drinks, and chocolate can improve mild cases of hyperhidrosis.

Sympatholytics, anxiolytics, and sedatives

Management of anticholinergic agents and beta-blockers can be very useful in mild instances of hyperhidrosis. Glycopyrronium bromide (Robinul), atropine, propranolol, and a large group of anxiolytic (e.g. Klonopin) and psychotherapeutic (e.g. Prozac) pharmaceuticals have been utilized as a part of the treatment of this issue, with differing degrees of accomplishment. Tragically, in everything except the mildest instances of hyperhidrosis, the dosages of medicines required to really control anomalous sweating frequently cause noteworthy antagonistic impacts, including sluggishness, dry mouth, widened students, photophobia, obscured vision, intense glaucoma, debilitated micturition, decreased bronchial emissions, clogging, disarray, queasiness, heaving, energy, tachycardia, palpitations, and arrhythmias. Consequently, numerous patients are compelled to end this road of treatment [13].

Antiperspirants

Most patients with the clinical disorder attempt an assortment of topical antiperspirants and antiperspirants yet discover no help until the point when they utilize 10% or 20% aluminum chloride (Drysol) connected day by day. These medicines might be very compelling for gentle to-direct instances of hyperhidrosis [14]. Shelley and Hurley propose a more entangled regimen utilizing aluminum chloride hexahydrate or zirconyl chloride in supreme liquor connected at sleep time, with an occlusive plastic dressing connected until morning [15]. They conjecture that the metallic antiperspirants enter the sweat organ pipe and shape an occlusive fitting by consolidating with ductal keratin; this treatment might be compelling for seven days on end. Unfortunately, skin disturbance is extremely regular with these antiperspirants and frequently constrains discontinuance of the treatment.

Botulinum toxin

Botulinum poison, a pieces neuronal acetylcholine discharge at the neuromuscular intersection and in cholinergic autonomic neurons; it therefore separates axillary sweat glands from their innervation. In an exquisite investigation, Heckmann., *et al*. [8] exhibited quantitatively the viable safe treatment of axillary hyperhidrosis by intradermal infusion of botulinum poison A. They additionally exhibited the life span of the alleviation delivered: 24 weeks after the infusion of 100 U, the rates of sweat generation (in the 136 patients in whom the rates were measured around then) were still lower than gauge esteems (67 ± 66 mg/min in the axilla that got 200 U and 65 ± 64 mg/min in the axilla that got fake treatment and 100 U of the poison). A study by Brehmer., *et al*. showed that the length of botulinum poison A's belongings in essential axillary hyperhidrosis increment with progressive medicines. The main infusion, in 101 patients, had a middle viability of 4.0 months, contrasted and 4.5 months for the second treatment and 5.0 months for the third infusion [16]. BOTOX injections have become a conventional and, frequently, active treatment for axillary hyperhidrosis. This treatment has likewise raised the profile of the condition with safety net providers. While, the accomplishment of the treatment is by all accounts very strategy subordinate (i.e. the treatment works when infusions are finished by one specialist and not when done by another). Significant disadvantages are the cost of the poison and the requirement for repeated treatments.

Surgical Therapy

Surgical treatment of axillary hyperhidrosis includes resection of the end organ (adenectomy) or disruption of sympathetic innervation to autonomically innervated structures, including sweat glands.

Axillary Resection

Skin resection

Wu., *et al*. and others advocate composite removal of skin and related axillary glands to treat axillary hyperhidrosis, but such resection is likely either to leave behind significant functional gland tissue or to create major scarring and restriction of range of motion. Such resections are more appropriately reticent for patients with hidradenitis [17].

Skoog procedure

The Skoog procedure is a well-tolerated, operative, and permanent treatment for axillary hyperhidrosis. It is only suitable for patients with hyperhidrosis solely or predominantly of the axilla. ETS is the more suitable choice for patients who also agonize from palmar or facial hyperhidrosis [18].

Endoscopic adenectomy

Arneja., *et al*. [19] have established an endoscopic technique of gland resection using an arthroscopic shaving device. Though the gland layer is not visualized with this method, it assurances to create a carefulness of resection that approaches open gland removal under magnification. If outcomes from this approach match those of the Skoog adenectomy in terms of cure rate, reoperation rate, and freedom from complications, this approach may well supplant open adenectomy.

Suction adenectomy

A liposuction method has been utilized to endeavor axillary adenectomy in hyperhidrosis and has been prescribed by Lillis and Coleman and Shenaq., *et al* [20,21]. A little bore liposuction cannula is utilized, with the suction opening moved in the direction of the underside of the skin. As the cannula is raked over the underside of the skin bearing the hypertrophic sweat organs, the desire is that a high extent of the organs are either cut off or upset. In the creator's understanding, a disappointingly high division of patients treated by this technique experienced backslide of unusual sweating. The early vanishing of abundance sweating is guessed to be the aftereffect of neighborhood denervation and organ disturbance; be that as it may, as patients are seen over the long run, reinnervation or potentially organ recovery happens (ordinarily inside the initial 6 mo postoperatively), and the side effects repeat. The creator has deserted this strategy for treatment; this conclusion is echoed by Ellis, who utilized curettage [22]. A variation technique for suction adenectomy utilizing ultrasonic

liposuction is thought to deliver a superior long haul come about by creating more removal than resection of organ tissue (despite the fact that this strategy is accepted to be administrator subordinate).

Sympathectomy

Endoscopic sympathectomy

ETS disturbs or ablates the high thoracic sympathetic chain to reduce sympathetic tone to the upper extremity and/or face. It is suitable for causalgia, unreconstructable vascular disease, and management of severe frostbite, Raynaud syndrome, and acrocyanosis, as well as its effectiveness in hyperhidrosis. ETS is carried out under general anesthesia through one or more small insertion incisions. Amid other things, sympathectomy outcomes in a relaxation of peripheral arteriovenous connections; this results in vasodilatation of the skin with increased warmth. It also creates a cessation of sweating. Useful effects reportedly last as long as 5 - 10 years. ETS is now regularly accomplished on an outpatient basis [23].

Open sympathectomy

Open sympathectomy (via thoracotomy), however still practiced, and is quickly losing ground to its endoscopic complement, which hypothetically achieves the same therapeutic goal with much less patient morbidity.

Preoperative Details

Endoscopic sympathectomy

Utilize history, physical and preoperative chest radiographs to avoid patients with prior aspiratory pathology. Numerous specialists want to have the anesthesia led with a twofold lumen endotracheal tube. Anesthesia observing ought to be broad and may incorporate blood vessel circulatory strain, ECG, beat oximetry, end-tidal carbon dioxide, and pinnacle aviation route weights.

Skoog procedure

A few numbers of preoperative preparations is required for this nearby soporific method. A shower with general cleanser or antibacterial cleanser (e.g. chlorhexidine) the morning of surgery is a fitting safety measure. The surgery is marginally more advantageous if the patient (or specialist) shaves the axilla, yet the operation is consummately possible in an unshaved field. In light of the relative hypoperfusion that fold analyzation delivers, a solitary measurement of intravenous anti-infection agents at the beginning of the operation is most likely a shrewd safeguard. The patient ought to be circumspectly free of any anticoagulant pharmaceuticals (e.g. headache medicine, ibuprofen, high-dosage vitamin E, ginkgo, ginger, garlic, dong quai).

Intraoperative Details

For unilateral sympathectomy or if the patient is to be turned through surgery, the lateral decubitus approach permits great representation of the sympathetic chain in the upper thorax. Access to both sympathetic chains additionally can be accomplished easily with the patient supine and both arms abducted [24]. Make a minor first opening in the anterior axillary line over the third rib and embed a needle into the pleural space to flatten the ipsilateral lung (or stop ipsilateral ventilation if utilizing a double-lumen endotracheal tube). Expel the needle and supplant it with a 5.0 or littler trocar coordinating the endoscope being utilized. Present the endoscope; the upper thoughtful chain and ganglia at that point are pictured effortlessly lying over the costovertebral intersections. Pleural grips should be brought down, staying away from (if conceivable) creation of a parenchymal pleural break. Numerous specialists need a moment port. This can be set utilizing a trocar at the fourth rib, likewise in the foremost axillary line [25]. Distinguish the second rib inside the chest cavity and open the pleura over it, beginning only average to the thoughtful chain and proceeding with along the side for roughly 1 - 2 inches. Search for the nerves of Kuntz, a neural communication bypassing the sympathetic chain from the second or third thoracic segments and innervating the upper extremity. Although this anatomic variant is present in only approximately 10% of patients, it should be divided (if present) to avoid a failure of sympathectomy. Make a longitudinal incision following the medial border of the sympathetic chain down to the fourth or fifth rib. Dissect thoracic ganglia T2, T3, and T4 free, and disturb the sympathetic chain at the appropriate level. Small blood vessels are

often encountered adjacent to the sympathetic chain and can be managed by clips or cautery. Approaches of disruption include cautery, harmonic scalpel, clip, or resection. Adapt the sympathetic resection slightly according to patient symptomatology. As innervation of the head and neck is from T1 to T5, whereas that of the upper extremities is from T2 through T9, treatment for facial hyperhidrosis possibly should include interruption above the T2 ganglion, whereas ablation of T5 probably is required to treat axillary hyperhidrosis. Wide proximal dissection of the sympathetic chain (above the T1 ganglia) can lead to injury of the stellate ganglion, and injury to the cervical C7 component of this ganglion can result in everlasting postoperative Horner syndrome [26]. Steadily enlarge the lung by positive pressure ventilation whereas air in the pleural cavity exits through one of the cannulas.

Suture closed the trocar sites in layers. If clinically indicated and if the patient is doing well, a sympathectomy then can be performed on the opposite side. Acquire a chest radiograph in the recovery room. A chest tube is not essential except a parenchymal air leak is noted. Flooding the operative field with saline while ventilating the lung might help determine an air leak. If an air leak is present, a small drainage catheter can be presented through one of the cannula sites and intended toward the apex.

Conclusion

Wide varieties of treatments are accessible for the treatment of essential axillary Hyperhidrosis, extending from topical to foundational solutions, intradermal infusions, to negligibly versus completely intrusive surgery. A few treatments convey essentially more serious dangers of unfavorable occasions than others. Frequently, the patient and doctor are required to investigate the alternatives by experimentation. While the viability of oxybutynin systemic treatment has been exhibited in numerous investigations, patients may locate the anticholinergic symptoms inadmissible. At last, the assurance of which methodology to seek after ought to be individualized to every specific patient, deliberately considering the impacts of axillary Hyperhidrosis on quality of life while measuring the potential advantages and antagonistic occasions of the proposed treatment.

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