

Treatment of Primary Hyperhidrosis

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Primary hyperhidrosis is a physically and emotionally distressing condition. Physicians should be aware of the various treatment modalities available for controlling or reducing the profuse sweating, which involves mainly the palms, soles, and axillas. The simplest methods, such as topical application of aluminum chloride, should be attempted first. If topical medications are ineffective, iontophoresis may provide relief, especially in patients with plantar or palmar involvement. When patients are unresponsive to other treatment options, surgical intervention may be warranted—excision of sweat glands in patients with axillary hyperhidrosis and upper thoracic sympathectomy in those with palmar involvement. Although excellent results have been reported, complications and resumption of sweating have occurred.

Hyperhidrosis is an aggravating condition that can often be consequential. Its distinction from normal sweating is subjective; thus, it defies precise definition. Primary (idiopathic, essential) hyperhidrosis is usually limited to the palms, soles, or axillas (or a combination of these sites). As could be expected with this distribution of involvement, the excessive perspiration is accentuated by mental stimuli more than by heat and exercise.¹ The affected patients, however, do not appear unduly anxious.² In patients with secondary hyperhidrosis (excessive sweating due to various known causes), treatment is accomplished by removal or control of the underlying cause. In contrast, primary hyperhidrosis must be treated by various techniques directed specifically at reducing the sweating to an acceptable level.

For patients suffering from primary hyperhidrosis, the disorder can be a major problem. Axillary hyperhidrosis (Fig. 1) is socially embarrassing and causes wetness, staining, and rotting of clothing. Patients with palmar involve-

ment (Fig. 2) are reluctant to shake or hold hands and may thus become socially withdrawn. They are unable to grasp objects; papers become wet; ink runs; metals rust; and electrical shock may occur. Plantar hyperhidrosis (Fig. 3) leads to bromhidrosis, friction blisters, infection, and rotting of socks and shoes. In this article, the various treatment modalities for primary hyperhidrosis are discussed.

ALUMINUM CHLORIDE

Treatment with topical medications should be attempted before other methods of intervention are considered. Aluminum chloride is the preferred agent and will be adequate for most patients with axillary hyperhidrosis. For example, it was found effective by Scholes and colleagues³ in 64 of 65 patients, by Ellis and Scurr⁴ in 35 of 42 patients, and by Perdakis and Hansen⁵ in 48 of 50 patients. The experience of Rayner and associates,⁶ however, has not been so promising. After first using aluminum chloride, 26 of their 38 patients opted for surgical treatment. Jensen and Karlsmark⁷ reported that aluminum chloride controlled the sweating in 12 of 13 patients with palmar hyperhidrosis and 10 of 11 with plantar involvement. In my experience, use of aluminum

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chloride for palmar and plantar hyperhidrosis has been less rewarding.

Some investigators have proposed that aluminum chloride initially decreases sweating by mechanically obstructing the eccrine sweat gland pore;⁸ however, the fact that sweating does not recur after removal of the stratum corneum by repeated application and removal of adhesive tape argues against this mechanism of action.⁹ Eventually, widening of acinar lumina and vacuolization and atrophy of the secretory cells occur and may be responsible for the decreased sweating.¹⁰

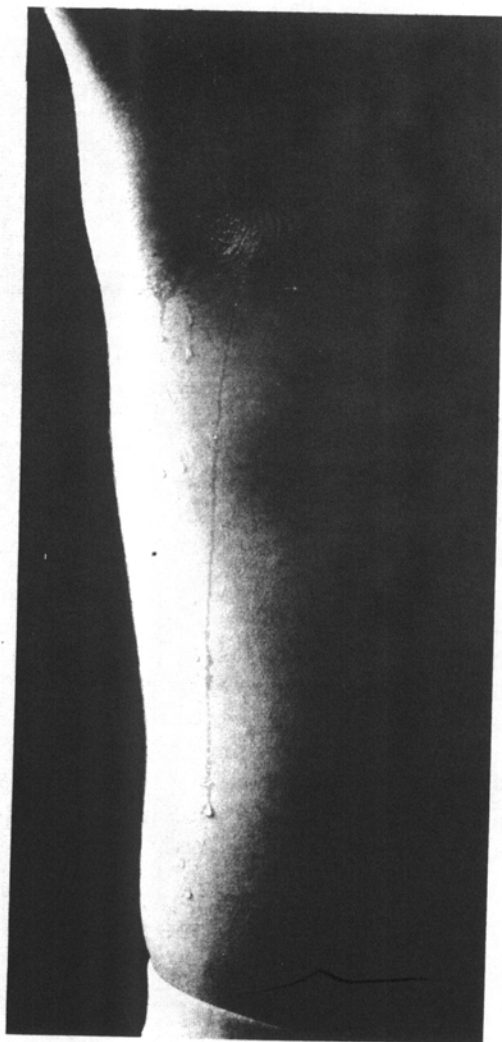


Fig. 1. Axillary hyperhidrosis. Despite room-temperature environment and no immediately preceding physical exertion, profuse axillary sweating occurred in this male patient.

Treatment guidelines must be strictly followed when aluminum chloride is used. To be effective, the aluminum chloride must remain on the skin for 6 to 8 hours. One should wait 24 to 48 hours after shaving before applying the medication. The skin, particularly in the axillas, must be dry before application, and sometimes it is helpful to blow-dry the axillas first. If moisture is present, irritating hydrochloric acid forms. Therefore, aluminum chloride hexahydrate (20%) dissolved in anhydrous ethyl alcohol (Drysol) is used. It is applied directly from the applicator bottle, preferably at bedtime to take advantage of the relative inactivity of the eccrine gland during the night. Washing before application increases the water content of the skin and should therefore be avoided. The next morning, however, the aluminum chloride must be washed off promptly before the onset of daytime sweating. Despite exercising these precautions, up to half the patients who use aluminum chloride experience some degree of axillary irritation.³ Usually, application of hydrocortisone cream relieves the irritation.

If the foregoing procedure proves ineffective, an occlusive technique can be attempted. With this method, vinyl chloride and vinylidene chloride copolymer sheeting (Saran Wrap) is used in the axillas and on the soles, and vinyl gloves are worn on the hands. In the axillas, a rolled-up sock is placed over the Saran Wrap and held in place overnight with a T-shirt, preferably one that is too small. Although it may be more effective, the occlusive technique is also more irritating. Whether the occlusive or nonocclusive method is used, the aluminum chloride should be applied nightly or on alternate nights until the desired degree of dryness is obtained. Thereafter, the agent should be applied as often as is necessary.

TANNING AGENTS

Tanning agents are usually effective in the treatment of hyperhidrosis but are associated with undesirable side effects that preclude their use in many instances. In my experience, glutaraldehyde has been the most useful. Juhlin and Hansson¹¹ found it effective on the soles of all 25 of their patients. Because of the brown stain produced, glutaraldehyde may be totally unacceptable to some patients, and others may agree to use it only on their soles. Concentrations that range from 2 to 10% are available, the degree of effectiveness and



Fig. 2. Palmar hyperhidrosis. Emotional stress associated with a visit to the dermatologist caused excessive palmar sweating in this female patient.



Fig. 3. Plantar hyperhidrosis. Constant moisture caused maceration and erosions of the foot.

the intensity of staining both increasing with the higher concentrations. Applications two to four times per week are usually necessary to maintain control. Glutaraldehyde must be obtained from a chemical supply house rather than a pharmacy. Tannic acid (strong tea) is less effective than glutaraldehyde and also stains. Although formaldehyde is reportedly effective, I believe it is too sensitizing to justify its use except in extraordinarily severe cases resistant to other therapy. Although methenamine converts into formaldehyde on the skin, it can be effective and is reported to be less sensitizing.¹²

IONTOPHORESIS

Iontophoresis is an effective alternative treatment for those patients in whom aluminum chloride fails to control hyperhidrosis. It is well suited for the palms and soles, anatomic areas in which aluminum chloride may be ineffective. The technique has been well described by Levit.^{13,14} A direct current of 15 to 30 mA is supplied by a galvanic generator. The electrodes are connected to shallow pans in which sufficient water has been placed to cover only the palm or the sole. Only two areas—for example, both soles—can be treated simultaneously. Usually, the anode is connected to one pan and the cathode to the other so that the current flows through the body. If both electrodes are connected to the same pan, the current flows only through the water and the treated part. With use of the latter method, higher levels of current and more treatment sessions are necessary to obtain the desired result.¹⁵

Although no structural changes are evident on microscopic examination,¹⁶ the resumption of sweating after removal of the stratum corneum by repeatedly applying and removing strips of adhesive tape suggests that the mechanism of action of iontophoresis is blockage at the level of the stratum corneum.¹⁷ Any scratches or cuts must be covered with petrolatum to avoid burning. In addition, jewelry must be removed from the parts to be treated. Any sudden interruption of the current will result in a nondangerous but annoying shock. Therefore, the hands or feet must be placed in or removed from the water while the current is off, and the current must be adjusted slowly. After a palm and sole (or both soles) have been submerged, the current can gradually be increased with the free hand until an uncomfort-

able or tingling sensation occurs, at which point the current should be decreased slightly. Because there is some evidence that the anode side is more effective than the cathode side, reversing the pans halfway through the treatment may be advantageous. Initial treatments should be limited to 20 minutes, but subsequent treatments may be increased if necessary. Iontophoresis should be performed three to six times weekly until the desired results are obtained. Maintenance treatments can be scheduled as often as they are needed. The addition of anticholinergic agents such as poldine methylsulfate¹⁸ and glycopyrronium bromide (glycopyrrolate)¹⁹ to the water has been reported to increase the efficacy of iontophoresis. Because systemic absorption occurs, the usual side effects associated with anticholinergic medications may be seen.

The preceding method is ideal for the palms and soles but is less adaptable to the concave shape of the axillas. Recently, however, Midtgaard²⁰ devised a special axillary electrode.

A battery-powered iontophoresis unit (Drionic) was made commercially available in 1984. It reputedly delivers a current of 20 mA²¹ and should therefore be effective. In my experience, however, it has been less effective than the galvanic generator units and should be reserved for milder cases of hyperhidrosis.

SYSTEMIC ANTICHOLINERGICS

Most patients with primary hyperhidrosis will experience transient benefits from systemic anticholinergic treatment; however, unpleasant anticholinergic side effects will also occur. Although these agents may be useful as long-term adjunctive therapy in some patients, because of their temporary effect I prefer to reserve them for those brief occasions when the need for control is greatest. Glycopyrrolate in a dosage of four to five tablets per day is the usual regimen. A combination of this drug and phenobarbital (Robinul PH Forte) is most beneficial in those patients with an emotional aspect of the hyperhidrosis.

FOOT CARE, BIOFEEDBACK, PSYCHOTHERAPY

For plantar hyperhidrosis, therapy should be supplemented with use of appropriate footwear and care of the feet. Patients should dry their feet carefully after bathing and apply an absorbent

foot powder. Nonocclusive footwear—that is, leather shoes and cotton or wool socks—should be worn. Thus, rubber and synthetic materials should be avoided except for those activities that necessitate their use. All stretch socks contain synthetic materials and should therefore not be worn.

In some patients, biofeedback²² or psychotherapy may be worth trying.

EXCISION OF AXILLARY SWEAT GLANDS

Surgical excision of axillary sweat glands will provide relief for most patients with axillary hyperhidrosis who are unresponsive to medical therapy. Various surgical methods have been used, all of which involve the removal of a sufficient number of eccrine sweat glands to reduce sweating adequately. The area of greatest concentration of eccrine sweat glands is approximately the same as the hairy portion of the axilla, particularly its apex. In each patient, the area of greatest sweating can be identified with use of a thin sheet of tissue paper or by means of the bluish purple color produced in starch-iodine exposed to sweat.

The simplest method is merely to excise the area of greatest sweat production at the apex of the axillas, as proposed by Hurley and Shelley.²³ The excision must be extended down through the fat. The incision should be made transversely, parallel with the normal skin creases, to minimize the possibility of restriction of movement postoperatively. This method is adequate for patients with moderate hyperhidrosis.

Hurley and Shelley²⁴ found that patients with severe hyperhidrosis required additional excisions peripheral to the central excision plus undermining and resection of the sweat glands around each excision. Other investigators have used modifications of this technique.^{25,26}

Because sweating may resume in areas treated by undermining and resection, patients with severe hyperhidrosis often require more extensive excisions. This approach considerably increases the possibility of limitation of movement due to contractural scarring; therefore, Z-plasty^{27,28} or bat-shaped excision²⁹ should be incorporated in the closure. These methods also avoid the possibility of tissue necrosis in skin overlying resected glands. Thus, whereas moderate axillary hyperhidrosis unresponsive to medical therapy can be adequately treated by simple excision, more severe cases are better treated by a wider exci-

sion designed to minimize the effects of scar contracture.

SYMPATHECTOMY

Many physicians recommend sympathectomy for the treatment of hyperhidrosis. Upper thoracic sympathectomy is done for palmar hyperhidrosis. This procedure will benefit patients with axillary hyperhidrosis as well, but with the availability of surgical excision of the axillary sweat glands, it can hardly be justified for involvement of this area alone. Various approaches for upper thoracic sympathectomy, including transaxillary, supraclavicular, anterior transthoracic, and posterior midline, have been used. Excellent results have been reported: "complete relief" in 61 of 62 patients,³⁰ "completely dry" palms in 66 of 70 patients,³¹ "medium to excellent" results in 95% of 133 patients,³² and "patient satisfaction" in 41 of 42 patients.³³ Surprisingly, plantar hyperhidrosis is often temporarily alleviated by this procedure also. A more sustained effect in patients with plantar hyperhidrosis can sometimes be obtained with use of lumbar sympathectomy. Because of the possibility of impotence and the fact that plantar hyperhidrosis is less troublesome than palmar involvement, however, lumbar sympathectomy should probably not be performed.

Although sympathectomy almost invariably relieves hyperhidrosis initially, usually sweating resumes eventually. Partial recurrent hidrosis is often mild and desirable, being preferred to the dryness of anhidrosis. Sometimes, however, the return of sweating is so complete that the procedure must be considered a failure.

Immediate and late undesirable sequelae are the main disadvantages associated with sympathectomy. The early complications, which vary somewhat with the type of procedure, include pneumothorax, pneumonia, wound infection, Horner's syndrome, and neuralgia.^{31,32} In addition to recurrence of sweating, the most common, troublesome late complication is compensatory hyperhidrosis—that is, excessive sweating in the nondenervated part of the body. This finding has been reported in up to 81% of patients.³² Gustatory sweating is also a common complication.

SUMMARY

In primary hyperhidrosis, the main areas of involvement are the palms, soles, and axillas. The

initial choice of treatment modality should be the simplest, safest, and least expensive method that can reasonably be expected to prove beneficial. Thus, topical application of aluminum chloride should be the first approach considered. In axillary hyperhidrosis, occlusive methods should be used if initial attempts with nonocclusive techniques of applying aluminum chloride prove ineffective. Hydrocortisone cream will often relieve irritation. If the hyperhidrosis affects the soles, aluminum chloride should be combined with meticulous care of the feet and use of appropriate footwear. If aluminum chloride does not decrease plantar sweating, application of glutaraldehyde should be given a trial. Although it produces a brown stain, it usually controls the hyperhidrosis. Iontophoresis will provide relief of palmar and plantar hyperhidrosis in almost all instances in which the preceding methods are ineffective. In some instances, one may wish to supplement the foregoing remedies with systemic anticholinergics, particularly for those temporary situations in which control is most critical.

If other treatment options are unsuccessful, surgical intervention can be attempted. In patients with axillary hyperhidrosis, local excision of the eccrine sweat glands is the definitive therapeutic approach. In patients with palmar hyperhidrosis, upper thoracic sympathectomy provides relief. With the availability of other highly effective therapeutic options, however, sympathectomy should rarely be necessary.

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