

Hand dermatitis

Hand dermatitis is a common occupational problem that often causes considerable stress and disability. This article describes the management of irritant and atopic hand dermatitis plus secondary protein contact dermatitis in a young woman.

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Hand dermatitis is a common problem often causing considerable distress and disability. A Swedish survey in 1996 of self-reported hand dermatitis found the annual prevalence to be 9.7%.¹ Almost twice as many women have hand dermatitis compared with men and this might be due to women more often doing skin irritating wet work (home and occupational) and more frequently washing their hands. Another Swedish population-based survey of 15,000 people found that of those reporting atopic dermatitis during childhood, 42% had hand dermatitis at some time in their life.² Mucosal atopy is a less important risk factor. Hand dermatitis is the most common occupational skin disease and up to 30% of all occupational diseases are dermatological.³

Like all forms of dermatitis, hand dermatitis can be categorised into exogenous and endogenous forms. Endogenous forms include atopic dermatitis, pompholyx (dyshidrotic eczema) and hyperkeratotic (psoriasiform) hand dermatitis. Exogenous forms include irritant contact dermatitis, allergic contact dermatitis, protein contact dermatitis, frictional dermatitis and photoallergic or phototoxic

dermatitis. Approximately 35% of cases of hand dermatitis are predominantly irritant contact dermatitis, 22% are atopic dermatitis and 19% are allergic contact dermatitis (idiopathic). Epidemiological studies suggest a mean duration of hand dermatitis of 10 years or more; irritant contact dermatitis is most often a more prolonged problem. A delay in the diagnosis and treatment of hand dermatitis may lead to a poorer prognosis.

The clinical pattern of hand dermatitis is often a poor guide to the aetiology. There are often multiple factors behind individual cases and the condition is often persistent and difficult to manage, as illustrated in the case described below.

Case scenario

A 23-year-old woman presented with an 18-month history of hand dermatitis (Figures 1a and b). It fluctuated in severity, affecting both the dorsal and ventral surfaces of her hands and fingers. It was dry, often fissured and sometimes vesicular. Itch and soreness were the main problems. She had also started to develop mild dermatitis elsewhere on her limbs and lower back. She

IN SUMMARY

- Hand dermatitis is the most common occupational skin disease and up to 30% of all occupational diseases are dermatological.
- Hand dermatitis can be categorised into exogenous and endogenous forms. Endogenous forms include atopic dermatitis, pompholyx (dyshidrotic eczema) and hyperkeratotic (psoriasiform) hand dermatitis. Exogenous forms include irritant contact dermatitis, allergic contact dermatitis, protein contact dermatitis, frictional dermatitis and photoallergic or phototoxic dermatitis.
- Management of hand dermatitis includes identifying and eliminating the causes, protecting the skin where practical, improving the skin's barrier function, and treating the inflammation of the dermatitis. This can be achieved by allergen avoidance, use of barrier creams, gloves and moisturisers, use of topical corticosteroids and other agents, and phototherapy.
- A case study approach is used in this article to illustrate the multiple aetiologies and the management of hand dermatitis.



previously had asthma and there was a family history of atopy. About 13 years ago she had angioedema and urticaria after eating seafood on several occasions (initially yabbie and later fish and crayfish).

During the four years before presentation she had worked as a chef in hotels in a rural town, performing various tasks including food preparation, waitressing and bartending. Although the dermatitis had started 18 months before presentation, over the last 12 months she had particularly noted flares in the dermatitis when she handled seafood of various types. On one occasion, she developed wheezing and cough when she handled fish. Some food juices also rapidly caused stinging on contact. In addition, she found rubber gloves caused irritation. Using polyethylene food handling gloves instead helped, but only to a limited extent. Her job required repeated hand washing (up to 30 times a day) using a pump style 'soft soap'. The dermatitis improved by about 20% if she had a few days off work, but 1% hydrocortisone cream and an over the counter moisturiser (10% glycerin in sorbolene cream) had no effect on it. Betamethasone valerate 0.02% ointment improved the dermatitis, but did not clear it.

Advice was given to the patient on avoidance of irritants and her dermatitis was managed with betamethasone dipropionate 0.05% ointment applied three times daily, which was then reduced to twice daily until the dermatitis cleared on her hands, limbs and trunk. Methylprednisolone aceponate ointment twice daily was applied to her face

until the dermatitis cleared. She was also given 20% liquid paraffin, 10% glycerin in aqueous cream as a moisturiser and a soap-free wash.

Radioallergosorbent testing (RAST) showed no reaction to latex and weak reactions to dust mite, cat dander and rye grass. The patient was referred to an allergist where skin prick testing showed reactions to cod, salmon, lobster, shrimp and mixed shellfish.

Patch testing to 108 allergens showed a 2+ reaction to nickel sulphate (the strongest reaction is 3+) and a 1+ reaction to the preservative phenoxyethanol. The relevance of these patch test reactions was not clear. She gave a history of previous reactions after contact with metal items that possibly contained nickel, such as jewellery. Handling metal items at work and home is unlikely to be a major factor in her dermatitis. Phenoxyethanol is a commonly used preservative in many products, including moisturising creams and sunscreen lotion (she recalled possible sunscreen reactions years ago). Phenoxyethanol was not known to be in any products she had been using recently, but she was advised to check ingredients list and to avoid contact with products containing it.

During patch testing, the patient commented that her hand dermatitis was still a problem (it settled while on holiday, but rapidly recurred on her return to work). She found it difficult to follow all the advice given, and even though her employer tried to help she was unable to eliminate all contact with seafood. A career change was suggested as a possible solution.

Figures 1a (left) and b (right). Partially treated protein contact dermatitis in the case presented.

continued



Figure 2. Idiopathic pompholyx dermatitis.

The patient's diagnosis

The patient was diagnosed with irritant and atopic hand dermatitis with secondary protein contact dermatitis, and possibly also allergic contact dermatitis.

The irritant contact dermatitis was triggered by the wet work and other irritants in the patient's workplace. Her history gave clues to the causes of her dermatitis, which included her atopic background, occupational exacerbation and the nature of her work, past history of food-induced angioedema-urticaria, and a history suggesting nickel allergy (possibly relevant).

Possible diagnoses

The differential diagnoses often overlap clinically. In general, the conditions to consider for patients presenting with hand dermatitis are listed below.



Figure 3. Hyperkeratotic dermatitis with features of psoriasis (well demarcated plaques).

Pompholyx

Pompholyx is an example of endogenous dermatitis as it is often idiopathic, although it may also be reactive from tinea elsewhere. It can also be a manifestation of systemic contact dermatitis; patch testing is required to identify this uncommon form. Pompholyx occurs as recurrent, often itchy, small vesicles on the digits, palms or soles. The severity varies from mild and infrequent to severe and disabling, with almost continuous large blisters forming (Figure 2).

Hyperkeratotic (psoriasiform) dermatitis is another common form of hand or foot dermatitis. Its features merge with psoriasis and some patients may have both (Figure 3). Thickened and hyperkeratotic skin predominate, sometimes sharply demarcated from the normal skin. It is prone to painful cracks (fissures). Recurrent vesicles may also occur, therefore pompholyx and hyperkeratotic (psoriasiform) dermatitis may overlap (Figure 4). Hyperkeratotic hand dermatitis is more common in manual workers, suggesting friction and/or trauma are factors (Figure 5). Irritant and allergic contact dermatitis cause some cases.

Psoriasis

Psoriasis is a common differential diagnosis of hand dermatitis. It may affect



Figure 4. Idiopathic hyperkeratotic dermatitis with focal vesicles (fingers).

only the hands or feet, or other areas as well, including the scalp. Typical symptoms of psoriasis are single or multiple demarcated scaly plaques on palms, soles, digits or dorsal surfaces. Pustules may be seen (these can be present in patients with dermatitis and tinea also), but not usually vesicles. The plaques are prone to painful fissures. Itch can occur and friction is often an aggravating factor. A sign of psoriasis is nail dystrophy (but this can also occur in patients with dermatitis and tinea), although onycholysis (lifting) with a normal nail plate and an 'oil spot sign' (focal brownish yellow discoloration of the nail bed) are more reliable signs. Biopsy may not distinguish psoriasis from dermatitis on palms and soles. Psoriasis and hyperkeratotic forms of dermatitis may be overlapping conditions.

Irritant and allergic contact dermatitis are clinically indistinguishable. They range from a mild, dry dermatitis to acute vesicular or weeping dermatitis and may be hyperkeratotic and/or fissured as well. Vesiculation does not help distinguish between them. Chronic irritant dermatitis tends to be more dry and appears on the dorsal surfaces of the hands. Figures 6a and 6b show irritant contact hand dermatitis in a welder and from over washing. Figure 7 shows allergic contact hand dermatitis.



Figure 5. Hyperkeratotic frictional dermatitis in a manual worker.

Keratolysis exfoliativa

Keratolysis exfoliativa, also known as recurrent palmoplantar peeling, is a condition in which the skin repeatedly sheds. It occurs on a noninflammatory base but may be sore or itchy. The occurrences may be seasonal (winter or summer) and it often recurs for years. Most cases are idiopathic. Although it is sometimes classified as a form of dermatitis, some consider it a distinct condition. Treatment is with bland emollients or keratolytic topical agents; topical corticosteroids have no effect.



Figure 6a (above left) and b (above right). Chronic irritant contact dermatitis a) in a welder and b) from over washing.

Keratodermas

Keratodermas are a complex group of both inherited disorders of keratinisation and acquired conditions. There are various patterns of thickened skin, usually on a noninflamed base although a mild red base may be present. Keratodermas are persistent and often hard to treat.



Figure 7 (left). Allergic contact dermatitis (patch testing showed allergy to coconut diethanolamide in a liquid hand wash – an uncommon allergen).

Tinea

Tinea is commonly missed on the hands. It may be found on dorsal or ventral palms and soles. Symptoms include a unilateral or asymmetrical rash, with an active edge and gradual expansion. Pustules, nail dystrophy, a lack of response to treatment and tinea elsewhere on the body are other signs of the condition. Tinea on the hands or feet can stimulate pompholyx dermatitis. Skin scrapings for fungal culture should be routinely carried out in all patients with hand dermatitis. This should be done before topical or oral antifungal therapy is given to the patient because if this therapy is not effective, it may make future skin scrapings negative for tinea.

usually occurs due to repeated contact with low grade irritants that ‘chip away’ at the skin barrier, leading to dermatitis. Atopic individuals are more prone to irritant contact dermatitis because of an impaired skin barrier in these patients.

The role of irritant contact dermatitis in the full spectrum of atopic disorders is still to be elucidated. However, recent research carried out on atopic individuals has demonstrated a key role of mutations in the gene encoding filaggrin, a protein that has a role in the structural integrity of the epidermis.⁴ Atopic individuals also have lower concentrations of epidermal ceramides, which are key lipids in the epidermal barrier. The inflammation of irritant contact dermatitis further compromises the skin barrier, allowing the skin to be more easily irritated with continual exposure to irritants.

Protein contact dermatitis is believed to occur as a result of peptide or protein molecules entering irritant contact

dermatitis-affected skin, causing contact urticaria (an immediate immunoglobulin E mediated, or type I, hypersensitivity reaction). Repeated episodes of protein contact urticaria seem to aggravate the irritant contact dermatitis, hence the term ‘protein contact dermatitis’, but the mechanisms for this are poorly understood. This differs from the more familiar allergic contact dermatitis, which is a delayed T cell mediated, or type IV, hypersensitivity reaction.

Mechanism of irritation

Little is known about the immunology of type I and IV hypersensitivity reactions in irritant contact dermatitis, although T cells and keratinocyte-derived cytokines play important roles. The various chemical and physical agents that can cause irritant contact dermatitis probably act by multiple mechanisms, including chemical and physical damage of keratinocytes leading to cytokine and chemokine release, and an inflammatory cascade.

Irritant and protein contact dermatitis

Aetiology

In the case presented, the patient’s atopic background predisposed her to irritant contact dermatitis triggered by the wet work and other irritants in her workplace. Chronic irritant contact dermatitis

Irritant contact dermatitis is a complex problem to investigate because of the vast number of chemicals that individuals may contact and the interactions with common physical factors (heat, cold, friction and abrasion) and individual susceptibility factors. In practice, common chemical irritants are water, soaps and detergents (particularly those with an alkaline pH, e.g. common soap), solvents, weak acids (e.g. citrus acids) and penetration enhancers in topical preparations (e.g. propylene glycol). Also, prolonged hydration from immersion in water or the use of gloves reduces the barrier function of the skin against irritants.

The main skin barrier is the lipid rich and proteinaceous 'dead' stratum corneum. Small, lipophilic, nonionised molecules are best able to penetrate this. In allergic contact dermatitis, it is speculated that the molecular size of allergens should be less than 500 kDa to penetrate the epidermis. It is not known what conditions are required for larger molecules (e.g. proteins) to penetrate the epidermal barrier. In protein contact dermatitis, the true allergens may be the proteins themselves or peptides from protein lysis or epidermal proteases. Epidermal penetration of proteins may occur through cuts, cracks, abrasions and burns of the skin as well as via dermatitic skin.

Investigations

Skin prick testing and RAST are used to determine allergens that cause protein contact dermatitis/contact urticaria. Skin prick tests should be read at 30 minutes and are carried out mainly by allergists although they are performed by some dermatologists. Results of these tests do not always agree. Standard occlusive patch tests on normal skin are often negative for protein contact dermatitis.

Allergic contact dermatitis is detected by occlusive patch testing, in which adhesive patches impregnated with allergens are applied, usually to the back, left in place for two days and the results read

two to four days after patch removal. The back must remain dry over the period of testing and low physical activity is advised. Often over 100 allergens are tested on an individual. There are about 450 commercially available allergens for testing, but the individual's own products, such as medicaments and cosmetics, can also be tested. About 50 allergens are common causes of allergic contact dermatitis. A markedly raised total immunoglobulin E level is also a useful indicator of atopy. Testing for irritant contact dermatitis usually only takes place in research settings.

Common causes of protein contact dermatitis include animal danders and saliva, natural rubber latex, seafood, meat and dairy products, and plant products. Dust mite, pollen and mould allergies are also forms of protein contact dermatitis of varying relevance to dermatitis, although they are often relevant to hay fever and asthma. Occasional/rare causes of protein contact dermatitis include enzymes (e.g. those used in laundry detergents) and hydrolysed wheat proteins (commonly used in cosmetics).

Management of hand dermatitis

Generic advice for managing hand dermatitis is to:

- identify and eliminate as best as possible the causes (allergic and irritant)
- protect the skin where practical
- improve the skin's barrier function
- treat the inflammation of the dermatitis for symptomatic relief.

Home, work and recreational environments need to be addressed. Patients with hand dermatitis have often received advice from many people and are confused about what to do next, particularly if the advice failed to help. The persistent nature of the problem and the uncertain prognosis add to the difficulty. Patients often feel they are dirty or are perceived by others as being dirty, and this adds to their tendency to wash their hands frequently (with or without soap), which aggravates the problem.

Barrier protection

Gloves

Gloves protect from chemicals and friction, but prolonged use leads to overhydration of the skin and so temporarily damages the epidermal barrier. Heat in the gloves from sweating or, for example, washing dishes in hot water, aggravates itch, and therefore they may not always be practical to use. Different types of gloves are better at protecting against penetration of different chemicals (see www.ansellchemsafe.com), and any fluid that enters the gloves will cause more irritation in the occlusive environment. Glove wearing can also result in allergic contact dermatitis due to allergy to natural rubber latex itself, to additives used frequently in natural rubber latex and synthetic rubber gloves and rarely to other chemicals used in vinyl gloves.

Gloves should be clean and left on for the shortest possible time. Some work places encourage workers to turn used gloves inside out to prolong their life; this is not a good practice. If gloves are to be worn for more than 10 minutes, inner cotton gloves should also be worn, although this will add to heating. Cotton, linen lined or leather gloves can be used to reduce dry friction. In winter, warm gloves reduce cold damage to the skin. Rings should be removed when wearing gloves as water can be trapped under them.

Barrier creams and moisturisers

Barrier creams containing dimethicone (a silicone) provide limited and often minimal protection against chemicals and friction but also act as an occlusive moisturiser. Lipid-rich, fragrance-free moisturisers are best for hands. These moisturisers are often based on petrolatum (soft paraffin), such as Cetaphil Moisturising Cream, Cream E45, Dermeze and Q.V. Cream. Moisturising creams or ointments in screw top tubs should be used if a less greasy moisturiser is required, rather than the lighter lotions sold in pump packs, which

contain more water. Some moisturisers, such as Aqueous Cream BP, contain low concentrations of the irritating emulsifier sodium lauryl sulfate and should be avoided.

Moisturisers should be applied immediately after washing and drying of hands. They can also be used as a barrier cream before wet work.

Contact with soaps, detergents and shampoos should be avoided if possible. Diluted bath oil should be used instead of soap. Soap-free washes and cleansing bars can be used, but some contain low concentrations of emulsifiers. Less frequent use of shampoos is advised, and gloves should be worn (and sealed with a rubber band) when they are used.

Occupational exposure

Minimising occupational exposure requires co-operation from the employer. Depending on the nature of the irritant exposure, advice may be needed from glove manufacturers on glove selection. Disposable vinyl gloves can be worn for general purposes. Nitrile rubber gloves are tougher and do not contain latex.

In the presented case, total avoidance of contact with seafood was advisable. However, this was difficult to achieve in a busy commercial kitchen. A partial job change (e.g. to a vegetarian restaurant) might have been an option but was not possible in the patient's small country town. A complete career change might be needed, but jobs such as cleaning, nursing, hairdressing or baking may also present problems.

Hand dermatitis may take many months to settle, even when patients almost completely avoid irritant or allergen exposure. Some individuals may enter a state of persistent post occupational dermatitis, which could last years and presents a challenge for the patient, clinicians and workers' compensation. Patients with occupational hand dermatitis should be encouraged to go through the Work Cover system as management of hand

dermatitis is expensive and retraining for other careers may be necessary.

Topical corticosteroids and other agents

Inflammation is generally settled with potent topical corticosteroid. Ointments are used rather than creams because the occlusive effect of the ointment enhances penetration of the corticosteroid. Ointments are also more effective moisturisers than creams.

Topical corticosteroids should be applied twice daily, although three times daily is often recommended for the first week. Methylprednisolone aceponate (Advantan, preferably the Fatty Ointment formulation), mometasone furoate 0.1% (Elocon, Novasone), betamethasone valerate 0.1% (Betnovate Ointment) or betamethasone dipropionate 0.05% ointment (Diprosone Dermatologicals, Eleuphrat) should be used in moderate to severe cases of hand dermatitis. Individuals with severe dermatitis should use more potent agents, such as the enhanced activity formulation of betamethasone dipropionate 0.05% ointment (Diprosone OV) or clobetasol 0.05% ointment (available only through compounding pharmacies).

The effect of topical corticosteroids can be enhanced by occlusion with vinyl or damp cotton gloves, which should be worn for a few hours after the evening application for a period of seven to 10 days. Lipid-rich moisturisers should be applied when needed between applications of topical corticosteroids. If the dermatitis clears, use of the corticosteroid is stopped, but use of the moisturiser is continued. If the dermatitis mildly recurs, less potent corticosteroid ointments, such as betamethasone valerate 0.02% (Antroquoril, Celestone M Ointment) or triamcinolone acetate 0.02% (Aristocort, Tricortone) should be used. The more potent agents should only be used if the dermatitis becomes more severe.

Topical corticosteroids are not always

effective and may cause skin atrophy and fragility when used for prolonged periods (this is particularly so for the more potent agents and if used under occlusion). Paradoxically, topical corticosteroids may also damage the skin barrier. Also, they may become less effective over time.

Other topical agents

Coal tar preparations can be effective in treating hand dermatitis, especially if there is an element of psoriasis. An example is 8% liquor picis carbonis and 5% salicylic acid in white soft paraffin, which is applied at night. Preparations containing coal tar can cause irritation, smell like asphalt and stain fabrics.

Topical calcineurin inhibitors are occasionally useful. Pimecrolimus cream 1% (Elidel) is a weak agent for hand dermatitis but as it is available only as a cream it is not likely to be of much help. Tacrolimus 0.1% ointment is available through compounding pharmacies and although it is more potent than pimecrolimus it is still not a potent agent. Also, it is very expensive. However, it does not damage skin barrier function.

Oral agents

Prednisolone 25 mg to 50 mg per day, reducing to zero over 10 to 14 days, gives good but temporary relief.

Individuals who have persistent hand dermatitis may need azathioprine, methotrexate (Methoblastin) or cyclosporin (Cicloral, Cysporin, Neoral, Sandimmun) or, if the condition is more psoriatic, they may need acitretin (Neotigason) for long term control.

Phototherapy

Individuals with severe hand dermatitis may require narrow band UVB phototherapy and/or UVA phototherapy with topical methoxsalen (Oxsoralen). This is not a strong treatment and should be carried out three times a week in a dermatologist's room.

Grenz ray therapy weekly for six weeks

Online dermatological resources

<http://dermnetnz.org/dermatitis/hand-dermatitis.html>

DermNet NZ: the dermatology resource

www.occderm.asn.au

Occupational Dermatology Research and Education Centre. Fact sheets on contact dermatitis, hand eczema and latex allergy obtainable through www.occderm.asn.au/Fact%20sheets/ContactDermatitis

www.eczemaguide.com/eczema_basics/eczema_like/hand_eczema_hand_dermatitis.html

Eczema Guide.com

www.skincarephysicians.com/eczema-net/hand_dermatitis.html

SkinCarePhysicians.com

(a low penetration form of x-ray therapy) is often effective, but usually only temporarily, and has a carcinogenic risk. It is available in only a few cities in Australia.

Allergen avoidance

Identification and avoidance of allergens is an important part of the management of hand dermatitis. Ideally, testing would be done for all patients with the condition. RAST is freely available and can be used if there is a history suggesting protein contact dermatitis, including to latex. If the history is highly suggestive of latex allergy and RAST is negative, the patient should be referred to an allergist for prick testing. However, latex prick testing has a small but definite risk of anaphylaxis.

Extensive patch testing is more difficult to access, labour intensive and expensive to perform. In practice it is usually carried out if the history is suggestive or if the dermatitis proves hard to treat. Considerable expertise is required to choose the allergens to test, interpret

the results and give appropriate advice. It is performed by a limited number of dermatologists and generally not by allergists.

In the case presented, the relevance of the two allergens identified on patch testing (nickel and phenoxyethanol) was not clear. This is a common situation. Brief handling of metal utensils is thought to be insufficient to cause hand dermatitis in patients who are allergic to nickel. Occasionally though, these patients will have their hand dermatitis settle with a low nickel diet followed for two months (see <http://dermnetnz.org/dermatitis/nickel-allergy.html>). Such a response suggests so called systemic contact dermatitis, in which eating foods containing the allergen can flare dermatitis, usually on the hands but sometimes elsewhere. The most often reported causes of this dermatitis are nickel and Balsam of Peru (which is used in perfumery and some foods).

Allergens that most commonly cause delayed type allergic contact dermatitis of the hands include epoxy resins, rubber accelerator chemicals, preservatives (including phenoxyethanol) in cosmetics, medicament creams and water based cutting oils, perfumes, lanolin, chromate (found in cement and leather), hair dyes and perming agents for hairdressers and chemicals in the daisy family of plants (*Asteraceae*, also known as *Compositae*) and certain other plants. There are many more uncommon causes of allergic contact dermatitis, including topical corticosteroids.

Follow up

The complex nature of hand dermatitis makes follow up of patients important. Although patients and clinicians may be tempted to give up attempts at treatment, generally something useful can be offered and a cure is certainly not uncommon. Patients prone to allergy may continue to develop new allergies and re-testing may be needed.

Conclusion

Hand dermatitis is a common problem and can have considerable impact at home and work. It can have multiple aetiologies and be difficult to treat, as illustrated in this case study. The history can give clues to the causes, including atopy, exposure to potential irritants and allergens at home and at work, and frequent hand washing. Identification and avoidance of the causes where possible, the use of gloves and barrier creams to protect the skin and symptomatic relief with corticosteroid and other agents form the basis of management. Some dermatological online resources are listed in the box on this page. **MT**

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