Occupational contact dermatitis

suspect it, treat it, and refer if persistent

Occupational contact dermatitis can have considerable impact at work and at home. Accurate and early diagnosis enables optimal management, and there may be multiple causes.

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Most people experiencing occupational skin disease have a form of contact or exogenous dermatitis, and the most frequently involved site is the hands. Incidence rates of contact dermatitis in western countries of five to 19 cases per 10,000 workers have been reported.[1] Occupational contact dermatitis incidence and prevalence rates of 2.0 and 3.5 per 10,000 workers, respectively, have recently been reported in Melbourne.[2]

Contact dermatitis is an irritant or allergic response caused by an external agent touching the skin. Most cases (about 70 to 80% of those presenting to specialised clinics) comprise irritant contact dermatitis. Allergic contact dermatitis accounts for 20 to 30% of cases, and contact urticaria for less than 5% of cases. Often there are multiple contributory factors, and frequently irritant and allergic contact dermatitis coexist.

Occupational contact dermatitis can be extremely disabling and have a profound impact upon a person's ability to look after themselves. It can be itchy and painful, and is usually visible. People may express concerns that it is contagious. Psychological effects include frustration and despair. Claiming compensation may be onerous and the necessity to change careers and concerns about finding suitable employment may add to the psychological burden. Many patients put up with the skin disease rather than apply for compensation because of these issues.

IN SUMMARY

- **Occupational contact dermatitis can significantly affect a person's quality of life. Early diagnosis, appropriate management and timely referral can improve prognosis.**
- **Irritant contact dermatitis is more common than allergic contact dermatitis. Both types may coexist and it may be impossible to differentiate them clinically.**
- **Young people with a history of eczema should be advised to take appropriate skincare measures as soon as they start work, in order to minimise their risk of contact dermatitis.**
- **People with a history of severe eczema affecting the hands should avoid occupations involving wet work, as this increases their risk of developing irritant contact dermatitis.**
- **There is no test for irritant contact dermatitis, which is diagnosed subjectively after allergic contact dermatitis has been excluded by patch testing.**
- **Immediate hypersensitivity reactions to proteins in latex and foods causes contact urticaria, which may also present as contact dermatitis. Prick testing is used to diagnose contact urticaria, although a radioallergosorbent test (RAST) is preferred if latex allergy is suspected because of the possibility of anaphylaxis with prick testing to latex.**

Table 1. Differential diagnoses for contact dermatitis of the hands

Contact urticaria
Endogenous eczema: hand eczema, atopic eczema, discoid eczema
Psoriasis
Tinea
Photosensitivity reactions

Table 2. Common causes of irritant contact dermatitis*

Water
Soaps and detergents
Solvents and thinners
Oils and grease
Heat and sweating
Dust
Fibreglass
Paper towels

* Listed in order of frequency, according to the Occupational Dermatology Clinic at the Occupational Dermatology Research and Education Centre, Melbourne.

Clinical appearance

Contact dermatitis may present with pruritus, redness, swelling, vesicles, papules, dryness and scaling, fissuring or secondary excoriation. The hands are the most commonly involved site, followed by the face (Figure 1).

It is not possible to differentiate allergic contact dermatitis from irritant contact dermatitis clinically, although allergic contact dermatitis may present with more florid changes and is more likely to spread to other areas of the skin. Differential diagnoses include endogenous atopic eczema and hand eczema (Table 1).

Irritant contact dermatitis

Irritant contact dermatitis is caused by direct injury to the skin that induces inflammatory responses via the release of cytokines by the skin cells. The injury is usually caused by chemicals but may result from physical factors.

Skin that is affected by irritant contact dermatitis is predisposed to sensitisation to topical agents and the subsequent development of allergic contact dermatitis.

Figure 1. Allergic contact dermatitis of the hands in a hairdresser.

Acute versus chronic irritation

Acute irritant contact dermatitis results from skin contact with a strong chemical, such as kneeling in wet cement, which is very alkaline. The more common chronic irritant contact dermatitis usually occurs as a result of repeated exposures to seemingly innocuous substances such as water, soap and detergents, which damage the skin in a cumulative manner.

Irritant contact dermatitis often starts with the so-called 'sentinel sign' (slight scaling and dryness involving the web spaces of the fingers) and then progresses to inflammation.

Common irritants

The most common irritants causing contact dermatitis are water and wet work, followed by soaps and detergents (Table 2). Cleaning agents, solvents, thinners, oils, cement, dusts and fibreglass may also cause reactions. The introduction of waterless alcohol-based hand cleansers in hospitals has decreased exposure of nurses to both wet work and paper towels, with some evidence of reduced rates of dermatitis.[3] However, these cleansers can be irritating in people who have pre-existing dermatitis.

Physical factors, including heat and sweating, friction and low humidity are also known to be irritating to the skin. Sweating may occur from long periods of occlusive glove use.

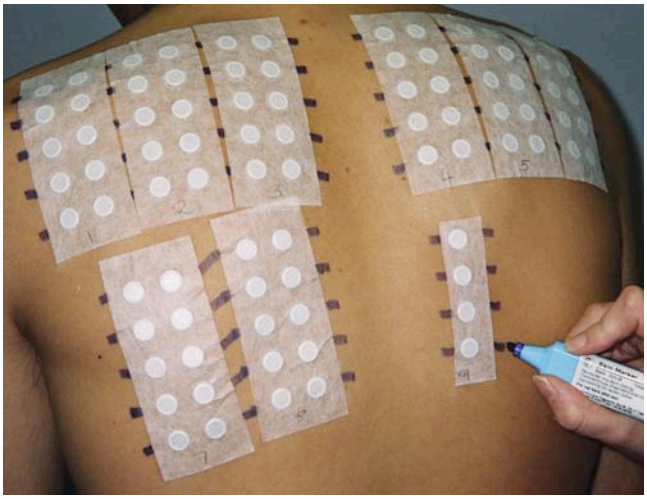

Figure 2. Patch testing for allergic contact dermatitis.

Figure 3. Positive patch test reactions to colophonium, thiuram, paraphenylenediamine and sesquiterpene lactone.

Diagnosis

There is no diagnostic test for irritant contact dermatitis. It is usually necessary to exclude allergic contact dermatitis before this diagnosis can confidently be made.

Allergic contact dermatitis

A delayed hypersensitivity reaction

Allergic contact dermatitis results from a delayed hypersensitivity allergic reaction, a type IV immunological reaction mediated by lymphocytes. Only chemicals below a certain low molecular weight are able to combine with skin proteins to form hapten–protein complexes capable of being recognised by immunologically competent Langerhans cells in the epidermis.

This initiates the process of sensitisation, resulting in the production of specifically primed T-lymphocytes throughout the skin. These lymphocytes release inflammatory mediators when they recognise the allergen that initiated the process. The inflammatory mediators are responsible for the clinical symptoms of allergic contact dermatitis.

Sensitisation

Sensitisation may be triggered by the first contact with a chemical, although months or years may elapse before the process occurs. The process of sensitisation takes from one to three weeks to develop. After the sensitisation phase is completed, allergic contact dermatitis will manifest within six to 48 hours of re-exposure to the allergen.

Fortunately, only a small proportion of people exposed to a sensitising chemical will develop allergic contact dermatitis. Currently there is no way to detect people susceptible to this process. If the skin barrier is damaged by irritant contact dermatitis, allergic contact dermatitis is more likely to supervene. Sensitisation may be lifelong and there is no desensitisation available for type IV hypersensitivity; prevention is therefore vital.

Diagnosis by patch testing

Patch testing is used to confirm the diagnosis of allergic contact dermatitis. This type of testing reproduces allergic reactions in a controlled manner. Small amounts of chemicals, in concentrations determined by international guidelines, are placed on aluminium discs mounted on hypoallergenic tape on a person's back and left for two days (Figure 2). Skin irritants must not be tested because they can cause skin ulceration. In Australia, dermatologists usually perform patch testing.

Positive reactions occur as red, itchy, palpable spots about the size of a five-cent piece and are interpreted at days two and five to seven (Figure 3). Some substances (photoallergens) need exposure to ultraviolet light to produce a reaction. Both false positive and false negative results may occur. As it is estimated that over 3600 chemicals may cause allergic contact dermatitis, testing has to be selective, based on the patient's history of skin allergen exposure.

It is important to establish the relevance of positive patch test reactions. Sometimes, positive reactions reflect past sensitisation to an allergen and are of no relevance to the current dermatitis. In some situations, a visit to the workplace may be required to determine if a positive patch test is relevant. In one case, a worker positive to rubber chemicals denied any contact with rubber at work; a workplace visit revealed that he regularly handled car tyres.

Common allergens

Common causes of allergic contact dermatitis identified by the Occupational Dermatology Clinic at the Occupational Dermatology Research and Education Centre in Melbourne are listed in the box on page 27. Rubber chemicals, chromate, epoxy resins and hairdressing chemicals are the most important occupational allergens in the Melbourne area.

Contact urticaria

Contact urticaria results from an immediate hypersensitivity allergic reaction (a type I immunological reaction mediated by IgE) to proteins, particularly those found in natural rubber latex, raw seafood and meat, and vegetables.[4,5] In susceptible individuals, immediate itching and redness occur after skin contact. This may fade and the rash may evolve into dermatitis that is clinically similar to irritant contact dermatitis or allergic contact dermatitis.

Testing for contact urticaria is by skin prick testing or radioallergosorbent tests (RAST). A RAST is recommended for

Causes of allergic contact dermatitis identified by the Occupational Dermatology Clinic, Melbourne*

Rubber

Allergy to chemicals used in the manufacture of rubber products (thiurams, mercaptobenzothiazole, carbamates) is not uncommon in people who wear natural rubber latex gloves to protect their hands. Often people develop irritant contact dermatitis initially and then start wearing rubber gloves. Unfortunately, irritant contact dermatitis with associated skin barrier damage predisposes to the development of allergy.

Chromate

Chromate is found in cement and in leather. Cement used to be the most common cause of chromate allergy but there are now more cases of workers sensitised to chromate from wearing unlined leather gloves or boots, particularly in hot conditions. Chromate is also found in anticorrosive paints and is used in electroplating.

Hair dyes, hairdressing bleach and perming solutions

Hairdressers are exposed to various allergens in dyes and perming solutions and to hairdressing bleach (ammonium persulfate) as well as to wet work and other skin irritants. Paraphenylenediamine, the main allergen in hair dye, is also found in some temporary tattoos erroneously labelled as containg only henna. These products have caused severe skin reactions and left people unable to tolerate further use of hair dyes or eyelash and eyebrow tints.

Epoxy resins

Contact with epoxy resins, or the hardeners with which they are mixed to create resistant surface coatings, may cause allergy. Epoxy resins are also used in some paints and adhesives.

Nickel

Nickel is the most common cause of nonoccupational sensitisation in women, caused by the wearing of 'cheap' jewellery. Even 9-carat gold may contain nickel. Allergy to nickel may be occupationally relevant in people handling metal objects such as coins and tongs.

Coconut diethanolamide

Coconut diethanolamide (cocamide DEA) is a weak detergent used in some hand cleansers (including those used in hospitals), liquid soaps, shampoos and cutting oils.

Preservatives and fragrances

Creams with a water base require preservatives, which may cause skin allergies. Formalin and formalin-releasing agents are often implicated. Fragrances in skincare products, deodorants and perfumes may cause allergic contact dermatitis. Tea tree oil has caused an increased number of allergic reactions recently; like other essential oils, it should never be applied undiluted to the skin.

Pine dust and rosin

Colophonium (pine rosin, previously known as colophony) is present in sticking plaster, waxes and wood dusts, and may cause allergic contact dermatitis.

Cobalt

Cobalt is present in cheap jewellery, cement and metal objects.

Textile dyes

Foot dermatitis in workers caused by the acrylic dye, Basic Red 46, present in dark coloured 'terry style' inexpensive socks has recently been described.[4] Working in wet boots and having particularly sweaty feet predisposes to this allergy.

Acrylates and phenol formaldehyde resins

Glues may contain acrylates as well as phenol formaldehyde resins. Acrylates are present in newer dental filling materials and are an important cause of allergic contact dermatitis in dental personnel.

Plants

Plants such as primula, alstroemeria, tulips, rhus and grevillea can cause allergic contact dermatitis in florists, horticulturalists and gardeners. Plant allergens include sesquiterpene lactones (Compositae), primin (primula) and tulipalin A (tulips and alstroemeria). Farmers and outdoor workers may develop Compositae dermatitis from the airborne pollen of capeweed, dogwood and other members of this plant family; this presents with dermatitis on the exposed areas of the face, the 'V' of the neck and the hands.

Antiseptics and biocides

Many ingredients of antiseptic cleansers used in hospitals and biocides added to soluble oils have the potential to cause allergic contact dermatitis.

* Listed in order of frequency.

latex allergy screening in people who frequently wear disposable or reusable natural rubber latex gloves, because of the risk of anaphylaxis with prick testing to latex (see box on this page).

Making the diagnosis

Clues from the history

The patient's history can provide useful clues to the diagnosis of an occupational contact dermatitis.

Core questions

- Where did the rash start? This is especially important in allergic contact dermatitis, as it may indicate the site of skin contact with the allergen, providing a clue to its identity. Involvement of the eyelids and neck is suspicious for allergic contact dermatitis. Irritant contact dermatitis commonly involves the hands.
- Has the rash spread? Irritant contact dermatitis usually remains confined to the hands and arms, while allergic contact dermatitis often spreads to involve other areas of the body, either by skin contact or by a generalised 'id' or sympathy reaction to the allergen, also known as 'autoeczematisation'.
- Does the rash develop immediately or is there a delay? How long does it last? Most cases of allergic contact dermatitis commence some hours after exposure to the allergen, commonly at the end of the day's work or even the next day. Latex allergy often manifests as burning and itching symptoms that develop within minutes of putting on latex gloves and that may resolve within an hour of removing the gloves.
- Does the rash improve during weekends or holidays? It is common for allergic contact dermatitis to improve a little over the weekends, but two to three weeks are usually required for the symptoms and signs to settle completely.
- What has been the response to treatment? Was improvement only temporary and then the condition recurred, suggestive of ongoing exposure to causative factors?

Other relevant questions

- What skincare products have been used on the skin? These may include soaps, abrasive hand cleansers, liquid soaps, moisturising creams, sunscreens, cosmetics, perfume, nail polish, aftershave lotion and hair dyes.
- Is there a history of allergies to drugs or to substances that touch the skin, such as to nickel in jewellery or to sticking plaster, which contains colophonium?
- Is there a history of atopy such as asthma, eczema or hay fever? Atopic people are more likely to develop irritant contact dermatitis and contact urticaria, especially to latex. Sometimes it is difficult to distinguish between pre-existing eczema and occupational contact dermatitis.
- What duties does the person perform at work? Which substances at work contact the skin? How many times are the hands washed per shift?
- What protective measures does the person use? Are gloves worn that are appropriate for the task?
- Are there aggravating circumstances, such as housework, child care or hobbies?
- What does the patient attribute the rash to? His or her opinion may warrant further exploration.

Assessing the patient

The assessment of a patient with suspected occupational contact dermatitis is summarised in Table 3.

It is important to recognise all factors contributing to occupational contact dermatitis so that they can be addressed appropriately. Clarification of skin exposures is often required to determine the work-relatedness of a patient's hand dermatitis. Patch testing and RAST or prick testing are often required.

Latex allergy

Risk factors for allergy to latex protein include:

- atopy
- pre-existing dermatitis
- use of powdered disposable latex gloves; glove powder is known to facilitate transfer of the latex allergen to the skin.

Latex allergy most commonly presents as redness and burning on the hands after the wearing of latex gloves, but it can be more severe. Some people are extremely sensitive and react to minute quantities of the allergen, as when ingesting food handled by people wearing latex gloves. Anaphylaxis has been reported in this situation.

It is preferable to perform a RAST to screen for latex allergy because of the possibility of anaphylaxis associated with prick testing to latex.

The use of nonpowdered latex gloves is most important, as this decreases the likelihood of latex allergy. With the possible exception of surgical gloves, which usually have lower amounts of latex protein, there is no reason to use powdered latex gloves in any workplace. Although most hospitals supply nonpowdered disposable latex gloves, some nursing homes still provide powdered gloves.

People allergic to latex should wear nitrile or neoprene gloves, which are made from synthetic rubber. Vinyl gloves do not provide sufficient protection from bodily fluids for use in healthcare, but they are preferred for many other occupations. Food handlers and hairdressers do not need to wear latex gloves.

Multiple diagnoses are common. It is possible for a nurse, for example, to develop irritant contact dermatitis from frequent hand washing, have coexistent immediate hypersensitivity to latex, be allergic to a chemical in a hand wash and have a background of atopic eczema. All these factors need to be considered in managing her dermatitis.

Whenever possible, patients at the Occupational Dermatology Clinic, Melbourne, are re-examined four months after patch testing to review the diagnoses and assess outcomes. Suboptimal outcomes may be associated with continuing exposures, inadequate treatment and poor understanding of the many factors contributing to the diagnosis.

High risk occupations

It is known that some occupations are associated with higher rates of workers developing contact dermatitis (Table 4).[7] Occupations involving frequent, repetitive hand washing or 'wet work,' such as food handling and nursing, have higher rates of irritant contact dermatitis. Occupations with exposure to known allergens, such as epoxy resins, have higher rates of allergic contact dermatitis. Hairdressing involves considerable exposure to both wet work and allergens.

It is known that people with a history of atopy, particularly atopic eczema, are more likely to develop irritant contact dermatitis, especially when they have a past history of eczema involving the hands.[8] People with a history of atopic eczema who embark upon a high risk career, such as hairdressing, are at greatest risk of developing occupational contact dermatitis and should be made aware of this risk. However, awareness of these issues among careers advisors and other professionals is suboptimal.

Prognosis

Complete recovery from irritant contact dermatitis may take a long time. Even when there is no longer clinical evidence of disease, the skin will continue to be more susceptible to further irritation for some three to four months. Patients and their employers must be made aware of this fact, as a return to previous duties may cause prompt recurrence of the dermatitis. Sometimes workers may be able to undertake modified duties to avoid the relevant exposures, but often time off work will be necessary. Time off work may also be helpful in clarifying the work-relatedness of the condition.

About one-quarter of patients with contact dermatitis appear to completely recover, about half continue to have intermittent problems, and the remainder have persistent disease.[9] Some studies have suggested that the longer the duration of allergic contact dermatitis before definitive diagnosis and advice, the worse the prognosis.[10] Atopy and the severity of the initial dermatitis may also be prognostic factors.

Some patients do not improve, even after cessation of work. Their condition has been termed 'persistent post-occupational dermatitis' and is not well understood.[9] Some patients are denied workers' compensation benefits when their condition fails to improve when they are off work, despite the fact that they had a clear history of initial work-relatedness.

Treatment

The treatment of occupational contact dermatitis is similar to that for endogenous eczema and should include the measures listed below.

- Awareness and avoidance of aggravating factors such as wet work, use of soaps and abrasive hand cleansers, and sweating from occlusive gloves.
- Use of appropriate protective gloves.
- Wearing cotton gloves under outer gloves (disposable and reusable) to decrease sweating and reduce exposure to heat and allergens in the gloves.
- Use of soap substitutes such as emulsifying ointments, moisturising lotions or commercially available products.
- Use of moisturising creams such as 10% glycerine in sorbolene cream. Many patients do not understand the difference between a thick, greasy cream or ointment in a tube or jar and a runny lotion from a pump pack. Ointments are more efficacious at moisturising the skin than lotions or creams but are more greasy and therefore better used before going to bed than during the day. Ointments also have the advantage of generally

Table 3. Assessing a patient with suspected occupational contact dermatitis

Is the appearance consistent with dermatitis?
Does the history suggest work-relatedness?
What substances contact the skin?
Is irritant contact dermatitis likely or is allergy suspected?
Is contact urticaria to latex possible?
Is patch testing necessary?
Is a workplace visit necessary?

Table 4. Occupations with the highest rates of contact dermatitis*

Floor finishers
Hairdressers
Machine operators
Dental personnel
Healthcare workers
Bakers and pastry chefs
Metal workers
Science technicians
Printers

* As assessed at the Occupational Dermatology Clinic, Melbourne.

not containing preservatives.
- Use of a topical corticosteroid ointment. Ointments are preferred to creams when treating dry and scaly dermatitis; however, creams are initially preferred when the skin is weepy as they assist in drying out the skin. Moderate potency corticosteroids are preferred for the hands, such as mometasone furoate 0.1% (Novasone, Elocon) or methylprednisolone aceponate 0.1% (Advantan), while the milder corticosteroid hydrocortisone 1% (Egocort) is preferred for the face. More than a single 15 g tube will probably be required, even if only the hands are involved.

Other treatments that should be considered include:
- treatment of any secondary infection
- a short course of oral prednisolone in severe cases, although repeated courses may indicate a need for further investigation and use of a corticosteroid sparing agent, such as azathioprine or cyclosporin A (Cicloral, Cysporin, Neoral, Sandimmun)
- ultraviolet light treatments, which are usually administered by dermatologists.

Guidelines for the management of contact dermatitis have been published in the *British Journal of Dermatology*.[11]

Prevention

Administrative measures

Administrative measures to be considered in the prevention of occupational contact dermatitis include:
- pre-employment examination and placement – people with past eczema should be advised on skincare measures prior to working in high-risk careers; however, pre-employment patch testing is generally not recommended by dermatologists
- worker education – including information about protective measures that should be used and procedures that should be followed if there is accidental exposure to chemicals
- establishment of an appropriate referral system to enable problems to be managed when they arise.

Environmental measures

Environmental measures that should be considered include:
- substitution of a less allergenic substance and, where possible, elimination of exposure to allergens
- engineering controls, including using closed systems with segregation of hazardous processes
- adequate ventilation
- good housekeeping (general tidiness, including appropriate labelling of chemicals).

Personal measures

Patients should consider the following preventive measures in addition to avoiding aggravating factors and using soap substitutes and moisturising creams and ointments as described above in the 'Treatment' section:
- wear protective clothing – cover the skin as much as possible, particularly the arms and hands
- wear gloves appropriate to the task, and use cotton undergloves – use thick nitrile gloves or laminated barrier gloves when working with epoxy resins as these substances can penetrate through many other glove types; vinyl gloves do not provide protection from bodily fluids and so are unsuitable for nurses, but are preferred for food handlers; cotton-lined gloves can be used but cotton undergloves are better
- use barrier creams – while these are largely ineffective at presenting a physical barrier to substances contacting the skin, they can make

Occupational contact dermatitis: the GP's role

GPs have a vital role in the management of work-related contact dermatitis by providing advice and, when appropriate, early referral.

Advice for patients

- Avoid further contact with skin irritants, such as soap or abrasive hand cleansers.
- Use appropriate skin protection at work and at home. This may require consideration of the best gloves to protect against skin irritants and allergens (information can be obtained from websites such as www.ansellchemsafe.com). Cotton gloves can be worn under disposable and reusable gloves to decrease sweating, minimise the likelihood of a reaction to latex or rubber accelerators and reduce exposure to heat, for example, when dishwashing.
- Choose an appropriate career. Teenagers and young adults who are atopic with past or present eczema may need career advice. Those considering a career that involves wet work will have to undertake good skincare measures as soon as they start work to maximise their chances of being able to pursue that career (see the Occupational Dermatology Research and Education Centre, Melbourne, website at www.occderm.asn.au).

Treatment and referral

- Treat with a combination of skin protection, soap substitute, moisturising cream and, when necessary, topical corticosteroid ointments.
- Refer early for diagnosis and patch testing if the condition recurs despite appropriate treatment.

substances easier to remove and they also raise skin 'consciousness'.

Role of the GP

Despite the fact that many workers accept 'dermo' as part of their jobs and may not initially attend their GPs, GPs have an important role in the diagnosis and management of occupational contact dermatitis. This role is outlined in the box on page 32.

Supplying written information to patients emphasises the importance of comprehensive skin treatment – see the Patient Handout on page 34.

Conclusion

Both GPs and specialists have roles in the management of occupational contact dermatitis. GPs should be able to provide advice to atopic patients regarding careers that will put their skin at high risk for disease. Patients with suspected occupational dermatitis should be treated early and comprehensively to lessen the risk of a chronic condition developing. Multiple unrecognised diagnoses may explain the failure to respond to optimal treatment.

Patients with severe hand dermatitis, especially if it is unresponsive to treatment, and patients with other forms of dermatitis who are working in high risk occupations should be referred early for patch testing to establish the role of allergy in their skin condition. MT

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