

CLINICAL PRACTICE

Hand dermatitis in primary care: A nurse practitioner's role in management

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Abstract

Purpose: Discuss chronic hand contact dermatitis (CD) and its management by nurse practitioners (NPs) in primary care.

Data Sources: Clinical studies, practice guideline, and clinic case.

Conclusion: Hand CD is a common form of dermatitis in primary care. Recognition and avoidance of irritants and allergens, proper hand protection, and topical treatments can alleviate this chronic problem, significantly relieve symptoms, and promote skin health.

Implications for Practice: A national shortage of dermatologists has caused more patients to seek treatment for skin disorders in primary care. NPs need to be prepared to diagnose and manage common skin problems in primary care.

Introduction

In the context of a national shortage of dermatologists, nurse practitioners (NPs) working in primary care are encountering an increased number of patients with skin problems. Many of these common skin problems can be adequately diagnosed and managed by well trained NPs. Contact dermatitis (CD) is a common condition that is defined as an inflammatory response caused by contact with an exogenous irritant or allergen. The hand is the most commonly affected site because of the exposure patterns. An estimated prevalence of hand dermatitis in the general population is 2%–10% (Elston, Ahmed, Watsky, & Schwarzenberger, 2002). Meding and Swanbeck (1987) studied hand dermatitis in a large industrial city and found a self-reported occurrence of hand dermatitis in a 1-year period to be 11% among 20- to 65-year olds. Thirty-five

percent of the cases were caused by irritants, and 19% of cases were caused by allergens. Women in the study experienced hand dermatitis twice as often as men.

CD has been found to be highly related to occupation. In fact, occupational CD constitutes up to 30% of all occupational diseases (Diepgen & Weisshaar, 2007). Hairdressers, dental technicians, healthcare workers, construction workers, and food service people have a significantly higher risk of developing CD (Koch, 2001).

Depending on the cause, CD can be categorized as irritant contact dermatitis (ICD) or allergic contact dermatitis (ACD). CD is also grouped by the chronologic course of the skin reaction and the duration of exposure as acute, subacute, or chronic. Chronic CD is the most common form and is a result of frequent and prolonged exposure to an irritant or allergic agent, potentially causing years of suffering. Treating this chronic ailment can be challenging

to NPs. However, with recognition, adequate patient education, and proper treatment, significant improvement and patient comfort can be achieved.

Etiology and pathophysiology

Allergic contact dermatitis

ACD is a T-cell mediated type IV hypersensitivity reaction in the skin. The allergens penetrate the skin and initiate a hapten-specific, localized immune response; skin keratinocytes play an important role in the pathophysiologic process of ACD (Gober & Gaspari, 2008). A genetic predisposition to an allergen, the amount of allergen, and duration of contact all affect the extent of allergic response. In patients with ACD, the most common allergens identified are preservatives, nickel, fragrances, topical antibiotics (neomycin and bacitracin), and rubber accelerators (Warshaw et al., 2007). Preservatives and fragrances are commonly found in personal care products such as shampoo, conditioner, moisturizer, liquid soap, and topical medications (Warshaw et al.). Nickel-related ACD can be caused by direct skin contact with metals containing nickel which are commonly found in jewelry, buttons on clothes, coins, keys, and other objects. In highly sensitive individuals, it can also result from systemic nickel exposure in drinking water and diet, and reactions tend to be in a dose dependent pattern (Jensen, Menn, & Johansen, 2006). Gloves, both latex and non-latex, are the main source of rubber accelerators causing ACD of the hands (Warshaw et al.).

In the past 20 years, the allergenic potential of topical corticosteroids has been well recognized. The nonhalogenated steroids such as hydrocortisone and desonide are the most common corticosteroids with the potential to cause ACD (English, 2000). In addition to corticosteroid itself, vehicle ingredients such as propylene glycol, formaldehyde-releasing preservatives, lanolin, and emulsifiers, which are commonly used in topical corticosteroids, have the potential to cause ACD (Coloe & Zirwas, 2008).

Irritant contact dermatitis

In contrast, ICD is a non-allergic response to damage to the outer layer of the epidermis. This happens when contact with a chemical causes direct skin damage by disrupting the skin barrier, damaging epidermal cells, and promoting the production of inflammatory cytokines such as tumor necrosis factor and interleukin from the keratinocyte (Corsini & Galli, 1998).

Most chemicals have the potential to cause ICD under the right conditions, but there is wide variability in the innate irritancy of different chemicals. The irritancy of

a chemical is determined in large part by its capacity to penetrate the skin, as well as by the frequency and duration of exposure to it. The inflammatory process continues as long as the irritant is in contact with the skin and healing is not completed. The common irritants are water, detergents (soaps), solvents, oils, dusts, fibers, acids, and alkalis. Exposure of the skin to liquid, use of occlusive gloves longer than 2 h per day, and frequent hand washing are the most common causes of ICD (Slodownik, Lee, & Nixon, 2008).

Endogenous factors influence an individual's susceptibility to CD. Younger people are more prone to ACD (Thyssen, Linneberg, Menn, & Johansen, 2007). Patients with a history of atopy which includes atopic dermatitis, allergic rhinitis (hay fever), and asthma are at an increased risk of developing ICD and ACD. This may be related to the impaired skin barrier in individuals with atopy. Intercellular lipids of the stratum corneum play an important role in homeostasis by the regulation of the skin's water barrier and water-holding capacity (Proksch, Olster-Holst, & Jensen, 2006; Slodownik et al., 2008).

As with patients with skin diseases such as atopic dermatitis and psoriasis, patients with CD have a compromised skin barrier with an altered lipid composition, which is characterized by decreased levels of ceramide and altered ceramide profiles (Choi & Maibach, 2005; Lebwohl & Herrmann, 2005). Skin barrier dysfunction leads to an increased risk of skin infection. For example, it has been confirmed that patients with atopic dermatitis are more frequently colonized with *Staphylococcus aureus* in lesional sites than in non-lesional sites, and the severity of their dermatitis is correlated with the colonization rate of *S. aureus* (Gong et al., 2006; Zollner et al., 2000).

Clinical manifestations

In general, ICD is caused by chemicals, with or without physical factors such as friction and mechanical abrasion. Skin lesions present only at sites where there has been repeated contact with irritants. Patients with ICD complain of burning, mild itching, and tightness and pain with motion of the hands. A mild case is typically characterized as red and scaly patches in the interdigital webs and on the knuckles of the dorsal hand (Figure 1). In moderate to severe cases, more areas or the entire hand can be affected (Figures 2 and 3). As severity increases, the lesions are characterized as increasingly dry, hyperkeratotic, scaly, fissured, and erythematous (Bauer, 2005).

In contrast to ICD, ACD tends to spread to more than the contact area and presents as an extremely itchy, erythematous reaction with or without vesiculobullous changes (Bauer, 2005). Patients often complain of severe itching with lesions that appear on every part of the hand



Figure 1 Mild hand dermatitis.



Figure 3 Severe hand dermatitis.



Figure 2 Moderate hand dermatitis.

that have even indirect contact with the eliciting allergen. The allergic reaction may spread to adjacent parts of the skin or even generalize to the wrist or arms (Bauer). Clinically, ICD and ACD can sometimes be differentiated by history and location: For example, a history of atopy with involvement between the fingers suggests ICD, while nail fold involvement is usually seen in patients with ACD (Elston et al., 2002).

Although ICD and ACD are different in etiology and are sometimes clinically distinct, in a given case the clinical picture often does not allow definite distinction between the two. In addition, it is not rare for patients to have both ICD and ACD at the same time, as the initial episode of ICD can precipitate an ACD from agents a patient previously tolerated (Marty & Cheng, 2005). It is very important to describe and document skin findings including symmetry of the lesions, morphologic changes, and exact location

of lesions such as palmar, dorsal, or the interdigital area of the hands (Brasch et al., 2007).

Diagnosis and differential findings

The diagnostic process begins with medical history and clinical findings. The history should include occupation, possible repeated exposures at work and home (including estimated frequency of hand washing and cleansing agent used), time course of the disease, individual work habits, skin care habits, use of protective gloves, and previous diagnoses and treatments (including self-treatment with over-the-counter products) (Brasch et al., 2007). ICD is diagnosed mainly by supporting history and clinical findings. No specific diagnostic test is available. If the history and clinical findings suggest ACD or if the patient is diagnosed with ICD but does not respond to appropriate treatment, then referral to a CD specialist for patch testing is indicated. Patch testing is the only testing that can confirm the diagnosis of ACD, and it can also identify the causative contact allergen. If patch testing does not identify an allergen, it suggests that the diagnosis is ICD. As mentioned previously, ACD may coexist with ICD because the skin damage caused by irritants reduces the allergen tolerance threshold of the skin.

Several diseases such as atopic hand dermatitis, tinea manuum, and hand psoriasis may occasionally mimic hand CD. Atopic hand dermatitis is generally childhood onset with flare ups that do not correlate with a pattern of irritant exposure (Proksch et al., 2006; Slodownik et al., 2008). Tinea manuum may present with superficial peeling instead of the fissuring seen in CD and can be ruled out by a negative KOH test. Hand psoriasis presents as well defined deep red plaques, often with typical psoriatic lesions in other parts of the body. Its peak onset is usually

in the early twenties, and flare ups are often related to increased stress level.

Management

Because CD is caused by an exogenous irritant or allergic agent exposure, the most important therapeutic intervention is avoidance of the identified or most likely causative exposures. When the irritants or allergic agents cannot be avoided completely from the patient environment, gloves can be worn as a protective measure. However, care must be exercised, as prolonged wearing of gloves can itself cause damage to the skin (Brasch et al., 2007).

Health education about skin care and protection play a significant role in managing CD. Preventive measures should be applied in daily practice in a correct and effective manner by the individual patient, and primary care providers should not overlook this part. A clinical study of 514 occupational skin disease patients of health care workers in Germany found that only 31.7% of patients regularly used barrier creams, emollients, or moisturizers, while 68.2% applied them inappropriately or not at all (Weisshaar, 2006). Proper patient education should include the following components: (a) Basic knowledge about skin structure and function, risk factors, and different forms of CD, (b) proper use of personal protective measures, such as gloves, and (c) overview and

discussion about skin care practices such as frequency of hand washing, soap choices, and correct application of skin care products, such as moisturizers, on the hands (Weisshaar, 2006). In general, patients with CD should be advised to decrease the number of hand washings with water and soap, and instead use alcohol-based sanitizers containing emollients. They should also apply moisturizing cream immediately after every hand washing and as often as needed. This practice accelerates the skin barrier repair and promotes the healing process (Larson, 2006). When soap is needed, less irritating products such as Dove bar soap, CeraVe Cleanser, or Cetaphil Gentle Skin Cleanser are good choices. Table 1 is a patient education handout for hand dermatitis used in the CD clinic at the Ohio State University medical center.

Moisturizers are an important first-line therapeutic intervention for patients with CD. Because patients with atopic dermatitis have a compromised skin barrier function partially caused by ceramide deficiency, applying moisturizers containing ceramide such as CeraVe cream can help to improve skin hydration (Wartewig & Neubert, 2007). Another useful product is Eucerin Plus Intensive Repair Hand Crème, which contains several therapeutic ingredients and is free of common allergens.

According to CD clinical management guidelines from Germany, topical corticosteroids combined with preventive measures are the most common treatment of CD. The steroids are used for their antiinflammatory

Table 1 Hand protection for hand dermatitis—patient education

Causes

- Hand dermatitis (hand eczema) is common. Hand rashes usually result from a combination of (a) sensitive skin and (b) irritation from materials touched daily such as soap, water, and rough surfaces, all of which can be irritating to the skin.

Treatment

- Skin protection is the most important part of treatment. You may not be able to toughen your skin, but you can minimize exposure to harsh substances. The following is detailed instructions on how to protect your hands. The more you follow them, the better you will do.
- Soap and water strip the natural oils off of your hands. Damaged skin cannot replace the oil like healthy skin does, so stripping the oils off your hands makes them worse.
- When washing your hands, use lukewarm water and a little mild soap, such as *CeraVe Cleanser* or *Cetaphil Gentle Skin Cleanser* (generic versions also OK). Rinse the soap off completely and dry gently.
- Try to apply *Eucerin Plus Intensive Repair Hand Crème* following every hand washing. It is much better to use small amounts of moisturizer frequently than to use large amounts occasionally.

Gloves

- Protect your hands from direct contact with soaps, detergents, scouring powders, and similar irritating chemicals by wearing waterproof, heavy-duty rubber or vinyl gloves with cuffs that go up past your wrist.
- If you get water or soap in a glove, take the glove off immediately, rinse it out, and let it dry before using it again. If a glove develops a hole, discard it immediately! Wearing a glove with a hole is worse than wearing no glove at all.
- If wearing rubber gloves is uncomfortable, then get rubber gloves that are too big for you and wear a pair of white cotton gloves under the rubber gloves.
- Wear waterproof gloves while peeling and squeezing lemons, oranges, or grapefruit, peeling potatoes, handling tomatoes, or working with other fruits, vegetables, or meats.
- Wear work gloves that are made of leather, heavy-duty fabric, or fabric with rubber palms when doing manual work or gardening. Dirty your gloves not your hands.
- Dish soap is probably the single most damaging thing to hands. Use a dishwasher as much as possible; let a member of your family do the dishes; or wear gloves at all times while doing dishes. Never let dish soap touch your hands.

properties (Brasch et al., 2007). Choosing an appropriate topical corticosteroid is highly individualized. Location of the lesion, severity, and acuity should be taken into consideration. In general, ointments and solutions are preferred to creams because creams usually contain preservatives and mixtures of chemicals, which may cause further skin damage (Coloe & Zirwas, 2008). Use of high potency corticosteroid products once daily on hands for less than 2 months usually results in better efficacy, and lower risk of side effects such as skin atrophy than chronic use of a less potent one. Additionally, remember that the skin on the dorsal hand is very thin, so it is prone to side effects from chronic topical steroid use. If a corticosteroid allergy is a concern, the least allergenic corticosteroid is desoximetasone ointment (Coloe & Zirwas; Mimesh & Pratt, 2006). In severe cases, a short course of oral prednisone beginning at 40–60 mg a day is a reasonable option (Brasch et al.).

Although topical calcineurin inhibitors (TCIs) such as tacrolimus ointment (Protopic) and pimecrolimus cream (Elidel) are not a standard option for CD management, a recent randomized clinical trial of 0.1% tacrolimus ointment showed it to be effective in reducing signs and symptoms in patients with nickel-induced ACD (Bel-sito et al., 2006). TCIs are nonsteroidal antiinflammatory agents, and they mainly work by inhibiting calcineurin in the T-cells. Protopic and Elidel cause down regulation of antigen-specific T-cell reactivity, decreasing the reaction response (Simpson & Noble, 2005). They are a reasonable alternative to corticosteroids as there is no risk of skin atrophy. It should be noted that calcineurin inhibitors are expensive, and they may not be covered by insurance. Some patients may experience a burning sensation with use.

The following case presentation illustrates the diagnostic process described above.

Case study

W.H. is a 67-year-old otherwise healthy male, who retired in 1996 from construction work. He developed an itchy rash on his leg in 1992 after an allergic skin reaction to topical Neosporin ointment. Soon after the reaction was stopped by oral prednisone, he developed a rash mainly on his hands. He has been on oral prednisone for several weeks, up to six times a year since then, whenever his hands flare up. In between, he has used trimacinalone ointment with menthol and camphor for itching. The ointment provided relief but the rash returned about 3 days after stopping use. W.H.'s medical history also includes squamous cell carcinoma of the cheek with surgical excision in 1996, but no history of atopy.



Figure 4 The case study.

Physical exam showed his hands were very dry and moderately rough. Mild general redness was present on both dorsum and palmar sides of his hands with fine white scaling and mild cracking in the fold area of palmar aspects (Figure 4). No rash was noted on other parts of the body.

The diagnosis of CD was made based on history and exam, and ACD was highly suspected. A patch test was performed and indicated a strong reaction to lanolin, Blue star ointment, fragrance, formaldehyde and formaldehyde related preservatives, neomycin, and bacitracin. These reactions confirmed the clinical suspicion of ACD.

The following interventions were carried out. Patient education included (a) avoid all personal care products that contain lanolin, fragrances, or formaldehyde related preservatives, (b) carry a personal bar soap instead of using liquid soap in public places to avoid these allergens in soaps, (c) identify and review an individualized “safe” personal care product list, and (d) use a safe sanitizer for hand hygiene instead of water and soap at home as much as possible. Medication treatment included (a) Eucerin Plus Intensive Repair Hand Cream: Apply to hands after every hand washing with water and as often as needed till complete healing is achieved, (b) desoximetasone 0.25% ointment, apply twice daily as needed. A 4-week follow-up call revealed the patient was symptom-free and satisfied with treatment.

Conclusion

CD is a common skin disease often seen in the primary care setting, and NPs should be capable of diagnosing and managing it. This includes understanding the pathophysiological principles behind both ACD and ICD and knowing appropriate mechanisms for treating

each. Thorough history of occupation in particular, as well as medical history and susceptible exposures can lead NPs to the appropriate diagnosis and treatment. NPs should consider referral for patch tests if ACD is suspected to further guide appropriate management. Proper teaching is a vital part of treatment as patients must learn and practice appropriate proactive and preventive measures to promote healing and prevent future CD. NPs in primary care settings are bridging gaps in many specialties. Therefore, it is important for NPs to be well prepared to educate and counsel patients, as well as to prescribe appropriate medications.

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