Management of Occupational Dermatitis

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- Occupational skin disease • Management
- Allergic contact dermatitis

Contact dermatitis is the most common occupational skin disorder, responsible for up to 30% of all cases of occupational disease in industrialized nations.[1] Epidemiologic data suggest that contact dermatitis accounts for 90% to 95% of all cases of occupational skin disease,[2–4] imposing considerable social and economic implications. Occupational contact dermatitis (OCD) is broadly classified into allergic and irritant subtypes. Irritant contact dermatitis (ICD) is widely quoted in the literature to account for 80% of OCD cases, with allergic cases held responsible for the remaining 20%.[5,6] However, as reviewed by Holness,[7] numerous studies have shown wide variation in the distribution of cases of ICD versus ACD. As discussed by Belsito[8] ICD accounts for 71% to 32% of OCD cases, whereas ACD is responsible for 60% to 34%.[9–14] The incidence rate of OCD is suggested by epidemiologic studies to be approximately 0.5 to 1.9 cases per 1000 full-time workers per year[1] with a 1-year prevalence estimate of 10% and lifetime prevalence of approximately 20%.[15,16] Mild cases of OCD are rarely registered, leading to underestimation of incidence by perhaps 20 to 50 times.[17] In the occupational setting, the hands are the most commonly affected area, with involvement in 80% to 90% of cases.[18] However, true epidemiologic data regarding OCD are lacking, secondary to a lack of standardization of case definitions and methods.

The economic, social, and psychologic repercussions of OCD defy understatement. The Bureau of Labor Statistics estimated 41,800 cases of OCD in the United States in 2000.[19] However, as a result of underreporting of mild cases, Lushniak has suggested the true number could approach 400,000 to 2 million cases per year.[20] Mathias had estimated the total annual costs in 1985 to be between $222 million and $1 billion in the United States alone.[21] A survey of reported cases of occupational hand eczema (HE) established that in 1 year, 19.9% to 23% of cases experienced prolonged sick leave and job loss respectively.[22] Showing the socioeconomic toll of OCD, in a 12-year Swedish questionnaire and phone interview study following 517 patients who reported OCD to the Social Insurance Office, 82% of HE patients reported having changed their work situation and 48% declared taking sick leave for at least 1 period of 7 days secondary to HE. In culmination, 15% of HE patients were excluded from the occupational workforce through unemployment or disability pension.[23]

One of the often overlooked burdens of occupational dermatitis, like any visible skin disease, is the concomitant social stigmata. As discussed by Diepgen and colleagues,[24] the importance of the hands as tools for communication and expression is manifested by the major psychosocial problems (eg, anxiety, depression, social phobia) affected individuals suffer. A lower quality of life, comparable to generalized eczema or psoriasis is reported in severely affected cases.[25,26]

CLINICAL FEATURES

Traditionally, the mechanisms underlying ICD and ACD were divided into nonimmunologic and immunologic pathways respectively. However, recent studies suggest significant pathophysiologic overlap between the entities. Likewise

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many, if not most, substances do not exclusively induce irritant or allergic reactions; instead being able to induce both.

Irritant Contact Dermatitis

Overview

ICD results from failure of the barrier function of the stratum corneum with the consequential release of inflammatory mediators from keratinocytes. In contrast to ACD, ICD is not a singular entity, but rather encompasses a spectrum of abnormal skin changes.[27] The lack of a standard definition of ICD results commonly in the misclassification of ICD and hence attendant over or underestimation of the disease frequency. Irritants are physical or chemical agents exerting a cytotoxic effect, which after single or repeated exposure elicits a non-allergic inflammatory host response. Irritants do not require sensitization (unlike ACD) and highly irritating substances such as alkalis, acids, and strong oxidizing and reducing agents may cause dermatitis with the first exposure.[28] Most cases, however, result from chronic cumulative exposure to 1 or multiple low grade irritants. ICD requires a threshold concentration (which may vary from person to person) above which the responsible chemicals cause dermatitis and below which they do not.

Risk factors

The development of ICD is dependent on exogenous and endogenous risk factors. Repeated exposure with nearly any chemical can result in ICD. The irritating potential of a substance is dependent on its physical properties, concentration, duration of exposure, and vehicle. Molecular size, ionization state, and fat solubility affect penetration through the skin.[29] As reviewed by Slodownik and colleagues,[29] physical, mechanical, and environmental factors significantly contribute to the onset of ICD; a fact which is unfortunately often overlooked.[30] Low humidity enhances irritability by decreasing ceramide levels in the stratum corneum[31] which can lead to cracking or fissuring. Heat or occlusion with gloves may precipitate ICD through increased exposure to sweat which is more irritating than water.[32] Common skin irritants include water, detergents, solvents, rubber, fiberglass, cutting fluids, and food products. Identifying a single substance causing ICD is inefficient at best, and often impossible, as ICD is usually multifactorial.[29] The most commonly implicated exogenous factor in ICD is "wet work".[33] Wet work includes wearing occlusive gloves for more than 2 hours per day, exposure of the skin to liquid for more than 2 hours per day, or frequent hand washing.[34]

Endogenous factors including sex, age, atopy and other skin disease, and anatomic site influence vulnerability to ICD.[35] Occupational ICD affects women nearly twice as often as men, in contrast to other occupational disorders which more frequently affect men. Although the picture remains cloudy, it has been suggested that the increased incidence in females is secondary to the disproportionate role women occupy in housecleaning, hair styling, and childcare. An atopic diathesis increases the susceptibility to skin irritants[36] and atopics should therefore be cautioned regarding professions with significant irritant exposure. Anatomic site further influences the propensity to develop ICD. The thickness of the protective stratum corneum varies considerably depending on location. It is thickest on the palms of the hands. Consequently, hand dermatitis often occurs on the dorsal hand and finger web spaces where the stratum corneum is thinner.

Presentation

Classically the dermatitis affects the dorsum of the hand and the finger webs where the protective stratum corneum is thinnest. Patients typically complain of pain, irritation, burning, and/or itching. Itching is typically less intense than what is seen in ACD. Two major forms of ICD are recognized: acute and cumulative. Cumulative ICD is more common than acute. Acute ICD can develop rapidly, within minutes after exposure to highly irritating substances, especially powerful acids and alkalis, and strong oxidizing and reducing agents. Typically, such exposure produces rapid development of burning and pruritus with coincident erythema, blistering, and swelling. The rash does not extend beyond the area of contact and typically resolves within a few weeks with removal of further insult. In contrast, weak irritants produce cumulative ICD, which may require months of continual exposure before the repair capacity of the skin is overwhelmed and ICD clinically manifests. Repeated exposure to mild irritants such as soap, water, greases, and solvents causes chronic cumulative irritant dermatitis. The chronic lesions of cumulative ICD appear lichenified with fissuring, hyperkeratosis, excoriations, and scaling and can take considerably longer to resolve than acute irritant dermatitis.

Pathogenesis

Historically, ICD was considered to be a nonimmunologic process. Conversely, current theories suggest that the immune system plays a central role in the pathogenesis of ICD. Irritants may be physical or chemical in nature. Either can initiate ICD if skin is subjected to exposure for a sufficient