CHAPTER 23

Occupational Airborne Skin Diseases

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Introduction

Most patients consulted in occupational dermatology are referred to as contact dermatitis cases; conceptually, the term “contact dermatitis” implies a direct contact of the skin with the offending (liquid and/or solid) agents. It is not surprising that, in this respect, hand dermatitis is the major complaint; this is due to direct manipulation – at work – of thousands of different products. It is clear that other skin sites can also be affected, either directly or indirectly (i.e. by the transfer of chemicals by hands).

Outside of this “familiar landscape”, the occurrence of occupational airborne dermatoses, i.e. due to agents carried by or through the air, has been underestimated in the past. Pirilä (1950) was the first to promote the concept of airborne dermatoses on clinical and experimental grounds. In his extensive paper, the author called attention – almost exclusively – to allergic conditions, referring, for instance, to cases of thiol dermatitis he had observed in Finland after World War II. Later on, examples of occupational dermatoses closely related to those caused by airborne skin offenders were occasionally reported throughout the relevant literature (Pirilä et al. 1963).

In the 1980s, more attention was paid to the problem after the publication of two review articles (Dooms-Goossens et al. 1986; Lachapelle 1986); nowadays, each year brings a blossom of new observations coming from various parts of the world. These publications reflect the diversity of problems encountered as a result of new chemicals and/or modified technical procedures. A better knowledge of occupational airborne dermatoses has practical implications in terms of diagnosis, treatment and prevention. There is a clear distinction to be made between airborne dermatoses and the “sick-building syndrome”: the latter refers to epidemics of subjective symptoms (itching or burning sensations) without any clinically visible signs, which occur in the work environment. This situation can be related, for instance, to low relative humidity but may also represent a mass psychogenic illness.

Airborne Offending Agents

Airborne offending agents are present under various forms.

Fibres

Different types of fibres can be implicated (Stam-Westerveld et al. 1994). The most classical example is fibreglass. Other examples include rock wool, carbon fibres and plastic materials, such as polypropylene fibres, etc. Fibres can be chemically inert and provoke only mechanical trauma to the skin. Carbon fibre dermatitis and most cases of fibreglass dermatitis are good examples of this condition. However, some fibres, such as epoxy-coated fibreglass, can produce allergic reactions.

Dust Particles

Dust is ubiquitous in the work environment. Dust particles are transported by air; they can agglomerate, visibly or invisibly, at the surface of the skin. Like fibres, some dust particles are chemically inert but can provoke mechanical (frictional) injury to the skin, whereas other particles contain chemicals that are dissolved by sweat; depending on their nature, these chemicals are responsible for several types of skin reactions (Lachapelle 1987).

Sprays

Water or other liquid-based products moving in a mass of dispersed droplets represent an important source of airborne offending agents. Any of numerous commercial products, including paints, cosmetics and insecticides that are dispensed from containers in this manner are good examples. Skin reactions may be of several types: irritant, eczematous, urticarial or combined.

Vapours and Gases

Vapour is defined as barely visible or cloudy, diffused matter, such as mist, fumes or smoke, suspended in the air. Different types of vapours and gases can be implicated, including fumes from chemicals, such as formaldehyde or hydrogen chloride, and gases from processes such as welding or painting.
the air. Gas has a more restricted meaning. Vapours and gasses may be, like sprays, irritant, allergenic or both.

Classification of Occupational Airborne Skin Diseases

Two categories of occupational airborne skin diseases must be considered.

"Systemic" Occupational Airborne Skin Diseases

Some skin conditions are a result of the toxic effects of chemicals that have been absorbed into the body tissues either by inhalation or transdermal penetration. We have coined the term "systemic" occupational airborne skin disease by analogy with the term "systemic contact dermatitis" (Lachapelle 1999).

The most classical example is chloracne, which, though rare, may serve as an extremely important indicator of internal poisoning and should be recognised by physicians treating occupational skin disease. Chloracneigenic substances, such as polyhalogenated naphthalenes are well known (Coenraads et al. 1994); tetrachloro-2,3,7,8-dibenzo-p-dioxin was the agent incriminated in the Seveso catastrophe, which occurred in northern Italy in 1976 (Plewig and Kligman 1993). Other examples of systemic occupational airborne dermatoses have been reported in the literature (Kanerva et al. 1991), but they are scarce and often poorly documented.

Occupational Airborne Contact Dermatoses

This group refers to all skin symptoms directly related to airborne contact of the skin with the accountable agents. In fact, all varieties of contact dermatoses due to direct contactants can also be provoked by airborne contactants. Furthermore, in many cases, direct contact and airborne contact can occur simultaneously; contact urticaria to latex proteins (Lagier et al. 1990) or allergic contact dermatitis to epoxy resins (Sommer et al. 1998; Le Coz et al. 1999) represent two good examples of such situations.

A systemic classification of occupational airborne contact dermatoses is proposed in Table 1. Although no specific criteria do exist for assessment of an airborne origin, some morphological and/or topographical aspects of the disease can help in the diagnostic procedure, as explained in the next paragraphs.

Table 1. Classifications of occupational airborne contact dermatoses

| Occupational airborne irritant (frictional and/or chemical) contact dermatitis |
| Occupational airborne allergic contact dermatitis |
| Occupational airborne phototoxic contact dermatitis |
| Occupational airborne photoallergic contact dermatitis |
| Occupational airborne (immunological and/or non immunological) contact urticaria |

Occupational Airborne Irritant (Frictional and/or Chemical) Contact Dermatitis

Airborne Irritant Contact Dermatitis Due to Fibres

Subjective symptoms are always present. Itching, stinging and burning sensations are the usual complaints of many patients, with or without objective signs. In particular, facial complaints are not often accompanied by detectable lesions; they correspond to the so-called "subjective irritant dermatitis". The eyelids, cheeks, nasal folds and neck are commonly involved. Subjective symptoms may occur on covered parts of the body, mainly in the flexures (axillae, groins, cubital and/or popliteal fossae) but also on the extensor aspects of the limbs or on the trunk.

Objective symptoms are usually present but vary in severity from case to case. Scratch marks, tiny papules or a maculopapular rash are the usual lesions (Fig. 1). Severe cases could involve secondary infection (pustules) from scratching. The most typical example quoted in the literature is fibreglass dermatitis. Symptoms include itching and prickling in areas of the skin.

Fig. 1. Fibreglass dermatitis: tiny papules and scratch marks