

Friction from paper and cardboard causing occupational dermatitis in non-atopic individuals

Niels H. Bennike, Jeanne D. Johansen and Torkil Menné

Department of Dermato-Allergology, National Allergy Research Centre, Herlev-Gentofte Hospital, University of Copenhagen, 2900 Hellerup, Denmark

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Friction is an important but under-recognized cause of physical irritant contact dermatitis, which is often related to occupational exposure of the hands (1, 2). We report a small case series of frictional dermatitis caused by occupational paper and cardboard handling with focus on the morphological pattern of disease.

Case Report

Between 2011 and 2014, the same experienced dermatologist evaluated 239 dermatitis patients as part of a medicolegal process assessing the relevance of occupational exposure for the development of skin disease. A detailed history was taken, and all patients had a clinical examination and relevant patch testing performed. A diagnosis of primary hand eczema was made in 199

patients (83%). In 5 (2.5%) of these patients, frictional trauma caused by occupational paper and cardboard handling was identified as the primary cause of hand eczema. Data for these patients are presented here.

Patient characteristics and occupational factors are summarized in Table 1. None of the patients had a history of atopic dermatitis or other endogenous dermatoses. With regard to handling paper and cardboard, only 1 patient (case 4) had a relevant positive patch test reaction (++) to colophonium. The eczema reported by the patients was characterized by initial dryness, scaling, erythema, and fissures. None of the patients reported vesicles on areas exposed to paper and cardboard handling. Morphological features at the clinical examinations were dominated by hyperkeratotic scaling and variable degrees of fissuring. The areas affected by hyperkeratoses are summarized in Table 2. The most severe reactions observed were on the finger pulps in 4 patients. In all patients, both hands were involved, with minor asymmetry. A variable degree of involvement of the lateral aspects of the fingers was observed in the 3 patients handling cardboard boxes. Most markedly, the hyperkeratoses observed in case 5

Correspondence: Niels H. Bennike, Department of Dermato-Allergology, National Allergy Research Centre, Herlev-Gentofte Hospital, Section 20A, Kildegaardsvej 28, 2900 Hellerup, Denmark. E-mail: niels.hoejsager.bennike@regionh.dk

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Table 1. Clinical and occupational patient characteristics

Case	Sex	Age (years) ^a	Occupation	Irritant	Exposure (on work days)	Time to onset of dermatitis
1	F	45	Receptionist	Paper and cardboard	50–200 elements/day	5 years
2	F	16	Insertion of advertisements in newspapers	Paper	3 h/week	NA
3	M	55	Envelope production facility	Paper	300–400 elements/day	14 days
4	M	51	Cooling storage facility and paper administration	Paper and cardboard	4–7 h/day	2 months
5	M	27	Frozen storage facility	Cardboard	7 h/day	6 months

F, female; M, male; NA, not assessed.

^aAge at onset of dermatitis.

Table 2. Sites affected by hyperkeratoses

Area affected	Patients (n = 5)
Palms	5
Volar aspect of fingers	5
Finger pulps	4
Lateral aspects of fingers	3
Skin over knuckles	1
Volar aspect of antebrachium	1

had an exact match with the contact surfaces on the hands and fingers when the patient was carrying a cardboard box, with involvement of the radial side of the first and second finger bilaterally. Both patients working in cooled storage facilities (cases 4 and 5) experienced their dermatitis despite using cotton gloves when handling cardboard boxes.

Discussion

Individual susceptibility to exposures causing irritant dermatitis is highly variable (1). This is evident in our small

case series of patients, with large variations in both exposure and time to onset of hand eczema caused by friction from paper and cardboard materials.

In previous reports on frictional dermatitis, a history of atopy has been reported in 32–41% of patients (2, 3). However, none of the patients presented here had a history of atopic dermatitis. Occupational hyperkeratoses with scaling of the fingertips, as in 4 of our cases, have previously been observed frequently in shoemakers cutting leather for soles (4). We speculate that frictional dermatitis could be associated with sensitive, hyperirritable skin, owing to a genetic predisposition that is independent of atopy. Genetic variations in suprabasal keratins leading to hyperkeratoses could be an area of interest for future research (5).

We would like to increase awareness of occupational irritant dermatitis caused by less evident frictional trauma, such as from daily handling of paper and cardboard materials. We suggest that physical irritants should be recognized as a cause of irritant contact dermatitis separate from chemical irritants, as proposed by Morris-Jones et al. more than 10 years ago (2).

References

- 1 Frosch P J, John S M. Chapter 16 – clinical aspects of irritant contact dermatitis. In: *Contact Dermatitis*, 5th edition, Johansen J D, Frosch P J, Lepoittevin J (eds): Berlin, Heidelberg, Springer-Verlag, 2011: pp. 305–337.
- 2 Morris-Jones R, Robertson S J, Ross J S et al. Dermatitis caused by physical irritants. *Br J Dermatol* 2002; **147**: 270–275.
- 3 McMullen E, Gawkrödger D J. Physical friction is under-recognized as an irritant that can cause or contribute to contact dermatitis. *Br J Dermatol* 2006; **154**: 154–156.
- 4 Mancuso G, Reggiani M, Berdondoni R. Occupational dermatitis in shoemakers. *Contact Dermatitis* 1996; **34**: 17–22.
- 5 Irwin McLean W H, Moore C B. Keratin disorders: from gene to therapy. *Hum Mol Genet* 2011; **20**: 189–197.