

CONTACT POINT

Riehl's melanosis caused by occupational exposure to personal protective equipment

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Riehl's melanosis (RM), also known as pigmented contact dermatitis, is characterized by a brown to gray pigmentation on the face and neck. Conventional treatments, including topical bleaching agents, oral tranexamic acid, and laser toning, are often unsatisfactory.¹

CASE REPORT

A 60-year-old man who had worked at a cement factory presented with slate-gray-colored hyperpigmentation on his nose and both cheeks (Figure 1A). He had used a cup-shaped dust mask (FFP1

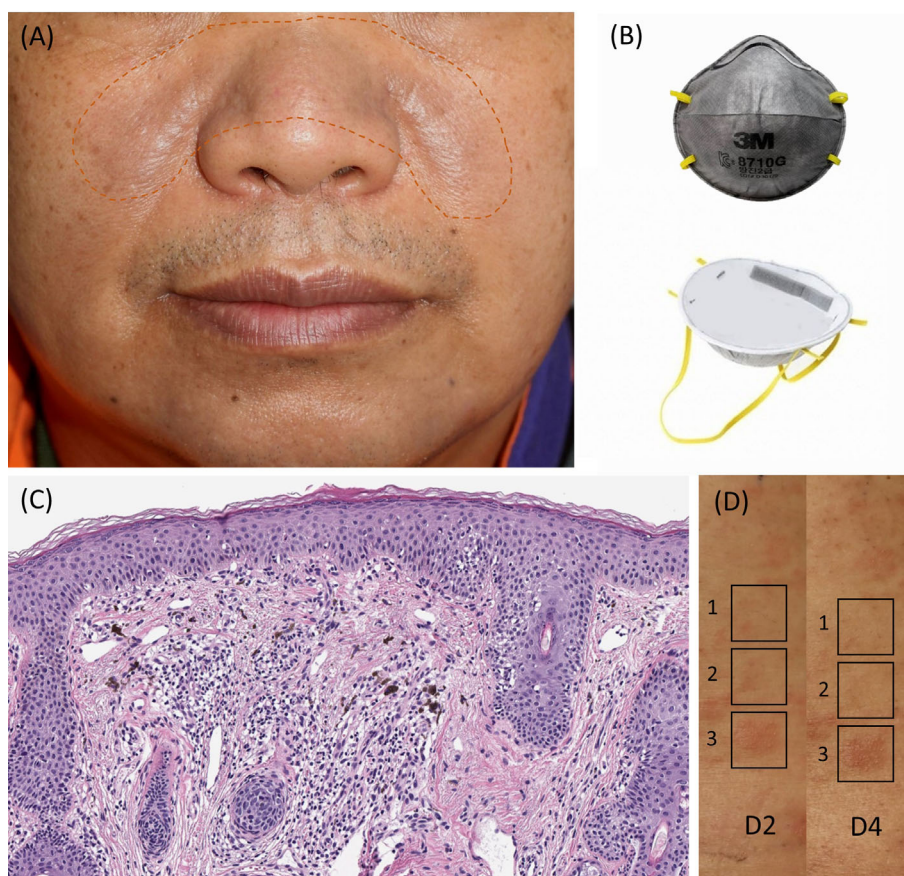


FIGURE 1 (A) A slate-gray-colored pigmentation on the nose and both cheeks. The shape and location of the pigmentation coincided with those of the mask's sponge strip. (B) The inner and outer views of the cup-shaped dust mask (FFP1 equivalent). (C) Histopathologic findings on the nose showed interface dermatitis patterns with marked pigment incontinence and increased dermal melanophages. (D) Patch-test results on both day (D) 2 and D4 showed a positive reaction (+) to the polyester/polyurethane foam sponge for nose protection (3) and negative to inner (1) and outer (2) surface of the mask

TABLE 1 Possible allergens in each of the mask components^{2,5}

Mask component	Possible allergens
Nonwoven polypropylene	Formaldehyde, polypropylene itself, bronopol
Adhesive chemicals	Dibromodicyanobutane (or methylidibromoglutaronitrile)
Rubber in straps	Rubber accelerators (Thiuram), Rubber antioxidants (N-isopropyl-N'-phenylparaphenylenediamine)
Metal wires or rims	Nickel, cobalt
Sponge foam strip	Dibromodicyanobutane (in polyester), Toluene-2,4-diisocyanate, 4,4'-diaminodiphenylmethane, hexamethylene diisocyanate, diphenylmethane-4,4'-diisocyanate (in polyurethane)

equivalent, Figure 1B) for 4 years at work, and pigmentation along the mask contact area had developed since last year. Histopathologic findings were consistent with RM, showing interface dermatitis patterns with increased dermal melanophages (Figure 1C). Patch tests were performed with the Korean standard series (KOR-1000, Chemotechnique Diagnostics, Vellinge, Sweden) and occluded for 48 hours; the sponge strip and inner and outer surfaces of the mask were also tested "as is." The sponge provoked positive reactions (+) on day (D)2 and D4 (Figure 1D). The shape and location of the lesion coincided with those of the mask's sponge and the temporal relationship between exposure and symptom, and the patch-test results strongly indicated the diagnosis of mask-induced RM. He moved to a section where mask wearing at work is unnecessary and showed a slight improvement after treatment with tranexamic acid and Kligman formula.

DISCUSSION

Skin damage, including contact dermatitis caused by personal protective equipment (PPE) has been reported frequently during the coronavirus disease 2019 (COVID-19) pandemic.² However, pigmentation with mask use was rarely reported. Eight health care workers in Singapore who had used N95 masks had experienced pigmentation on the face during the severe acute respiratory syndrome outbreak. Possible causes were suggested as postinflammatory hyperpigmentation or pigmented contact dermatitis without histologic confirmation.³

Mask-covered skin becomes vulnerable to contact dermatitis, and masks contain various potential allergens. A warm and humid environment created from the continuous expiration into a confined space increases transepidermal water loss and skin pH, consequently altering the skin's susceptibility to allergens.⁴ Furthermore, several allergens have been reported in each of the mask components (Table 1).^{2,5} In our case, polyurethane/polyester sponge was the culprit. According

to reports, dibromodicyanobutane, a preservative in adhesives used in polyester foam strip, or cross-linkers in polyurethane such as toluene-2,4-diisocyanate, hexamethylene diisocyanate, 4,4'-diaminodiphenylmethane, and diphenylmethane-4,4'-diisocyanate can be culprit allergens.^{5,6}

Herein, we have reported a case of histologically confirmed RM from occupational exposure to PPE. As wearing masks has become a daily affair in the COVID-19 pandemic era, dermatologists should consider the possibility of refractory pigmentation on the face due to masks.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS

Dong Hyo Kim: Conceptualization (equal); investigation (equal); visualization (equal); writing - original draft (equal); writing-review & editing (equal). **Dong Hun Lee:** Conceptualization (equal); investigation (equal); supervision (equal); writing-review & editing (equal).

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