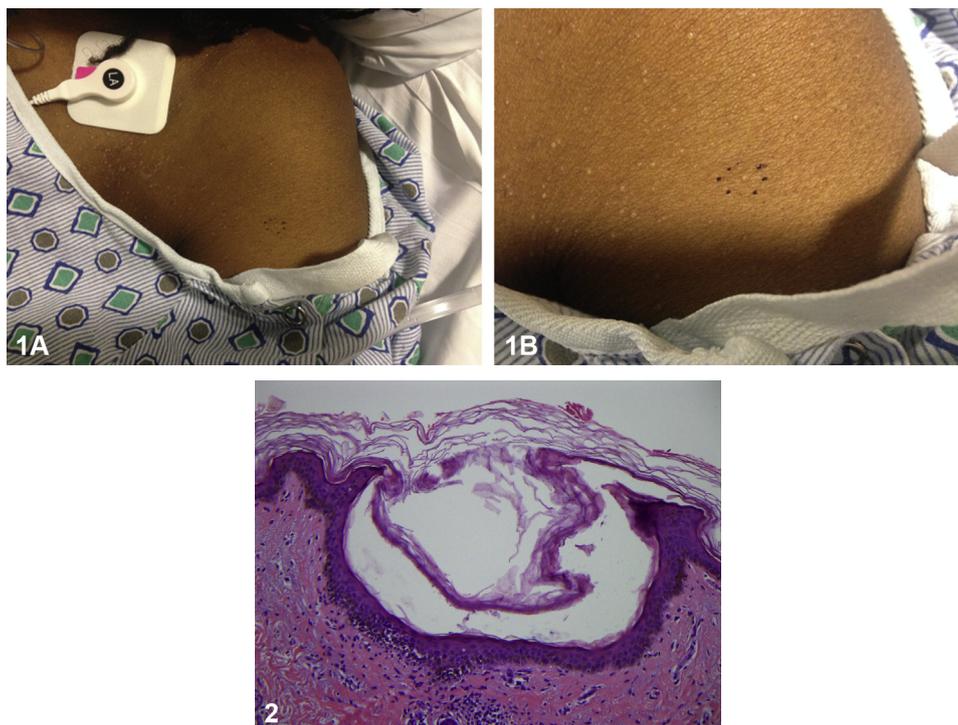


Clear vesicular eruption in the intensive care unit



Margaret Wat, MD, PhD, Susan Nedorost, MD, and Kord Honda, MD
Cleveland, Ohio

Key words: fever; hypernatremia; intensive care unit; miliaria crystallina; opioids; perspiration.



A 60-year-old woman with severe chronic obstructive pulmonary disease was admitted for *Pseudomonas aeruginosa* pneumonia requiring intubation. She was febrile for 3 days and began to defervesce shortly after piperacillin/tazobactam initiation. She experienced profuse perspiration, hypernatremia which resolved at defervescence, and anxiety. Approximately 3 days after her last fever, painless, nonpruritic, tiny clear vesicles developed scattered across her bilateral chest and shoulders, crossing dermatomes, and sparing mucosae (Fig 1).

She had also recently received dexmedetomidine, sertraline, buspirone, benzodiazepines, and opioids within days of the rash onset. Five days after it began, the eruption spontaneously resolved.

From Case Western Reserve University School of Medicine and University Hospitals Cleveland Medical Center.

Funding sources: None.

Conflicts of interest: None disclosed.

Correspondence to: Margaret Wat, MD, PhD, University Hospitals Cleveland Medical Center, Department of Dermatology, 11100 Euclid Ave, Cleveland, OH 44106. E-mail: margaret.wat@case.edu.

JAAD Case Reports 2019;5:754-6.

2352-5126

© 2019 by the American Academy of Dermatology, Inc. Published by Elsevier, Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jdc.2019.04.024>

Question 1: What is the most likely diagnosis?

- A. Acute generalized exanthematous pustulosis (AGEP)
- B. Herpes simplex
- C. Miliaria crystallina (MC)
- D. Pseudoporphyria
- E. Varicella

Answers:

A. AGEP — Incorrect. AGEP presents as subcorneal and intraepidermal pustules and usually occurs within days of medication administration, most commonly caused by antibiotics. Histology findings often show subcorneal pustules with neutrophilic exocytosis, spongiosis, and occasional eosinophils.

B. Herpes simplex — Incorrect. Herpes simplex often appears as grouped vesicles near mucosal surfaces; this patient's rash spared mucosae. Herpetic lesional biopsy results exhibit cytopathic changes such as enlarged and pale keratinocytes, multinucleation, and margination of chromatin at the nuclear periphery.

C. MC — Correct. Small 1- to 2-mm flaccid vesicles that rupture easily characterize MC. MC resolves spontaneously and requires no treatment. Histology findings show an intracorneal vesicle with an orthokeratotic roof centered on an acrosyringium (Fig 2).

D. Pseudoporphyria — Incorrect. Pseudoporphyria, a bullous dermatosis caused by hemodialysis or phototoxicity induced by medications, resembles porphyria cutanea tarda, but without elevated porphyrin levels in serum, urine, or feces; it typically occurs on dorsal hands, extensor legs, and face, rather than the trunk. Histologically, pseudoporphyria manifests as a subepidermal blister with dermal papillae projecting into the blister (festooning) and elongated eosinophilic basement membrane deposits in the epidermis (caterpillar bodies).

E. Varicella — Incorrect. Varicella often appears as *dew drops on a rose petal*—vesicles on an erythematous base and at various stages of development; no erythema underlies this patient's vesicles. Varicella histologically appears identical to herpes simplex.

Question 2: Which of the following describes the pathogenesis of MC formation?

- A. Dilation of pilosebaceous orifices with keratinous material

B. Nodular deposition of homogenous hyaline material in the papillary and mid dermis

C. Obstruction of the eccrine duct in the stratum corneum

D. Obstruction of the eccrine duct within the stratum basale or spinosum

E. Obstruction of the eccrine duct near the dermoepidermal junction

Answers:

A. Dilation of pilosebaceous orifices with keratinous material — Incorrect. This description refers to comedone formation.

B. Nodular deposition of homogenous hyaline material in the papillary and mid dermis — Incorrect. This description refers to formation of the classic adult type of colloid milium.

C. Obstruction of the eccrine sweat duct in the stratum corneum — Correct. Obstruction of the eccrine duct as it courses through the stratum corneum results in accumulation of sweat beneath the stratum corneum and clear flaccid vesicles.

D. Obstruction of the eccrine sweat duct within the stratum basale or spinosum — Incorrect. This description refers to miliaria rubra, in which blockage deeper in the epidermis leads to trapped perspiration and subsequent leakage into the lower epidermis and upper dermis, inducing an inflammatory response that results in erythematous papules and pustules.

E. Obstruction of the eccrine sweat duct near the dermoepidermal junction — Incorrect. This description refers to miliaria profunda, a more inflammatory reaction caused by duct obstruction at a deeper level.

Question 3: Which of the following has not been commonly associated with MC?

A. Warm and humid climates

B. Fever

C. Hyponatremia

D. Opioids

E. Antimalarials

Answers:

A. Warm and humid climates — Incorrect. Warm and humid climate is among the most common

associations with MC. In infants, excessive warming caused by overswaddling and occlusive dressings also lead to MC.

B. Fever — Incorrect. Fever poses a risk for MC, although it is the perspiration during the defervescence stage, rather than the fever, that precipitates MC. In 2 febrile intensive care unit patients, several days to weeks of fever or profuse sweating preceded MC; in a patient with acute lymphoblastic leukemia, hypernatremia, and fever to 105°F, MC began subsequent to fever and resolved within 72 hours of fever subsidence.^{1,2}

C. Hypernatremia — Incorrect. A 40-year-old man and a 16-day-old nonswaddled infant, both with hypernatremia, had MC.^{3,4} Excess sodium secretion through sweat in hypernatremic states likely damages eccrine ducts, allowing sweat accumulation and microcyst formation.^{4,5}

D. Opioids — Incorrect. Opioids indirectly act on the parasympathetic nervous system to increase eccrine glandular secretion, and 2 other intensive care unit patients administered opioids had MC.¹

Other medications such as bethanechol, isotretinoin, doxorubicin, and dexmedetomidine may cause MC by stimulating sweat release.

E. Antimalarials — Correct. MC is not a reported common side effect of antimalarials such as hydroxychloroquine, chloroquine, or quinacrine.

Abbreviations used:

AGEP: acute generalized exanthematous pustulosis

MC: Miliaria crystallina

REFERENCES

1. Haas N, Martens F, Henz BM. Miliaria crystallina in an intensive care setting. *Clin Exp Dermatol*. 2004;29(1):32-34.
2. Yanamandra U, Khadwal A, Malhotra P, Varma S. Miliaria crystallina: relevance in patients with hemato-oncological febrile neutropenia. *BMJ Case Rep*. 2015;2015.
3. Chao CT. Hypernatremia-related miliaria crystallina. *Clin Exp Nephrol*. 2014;18(5):831-832.
4. Engur D, Türkmen MK, Savk E. Widespread miliaria crystallina in a newborn with hypernatremic dehydration. *Pediatr Dermatol*. 2013;30(6):e234-e235.
5. Shuster S. Duct disruption, a new explanation of miliaria. *Acta Derm Venereol*. 1997;77(1):1-3.