Erythematous scaly plaques with erosions in a 4-month-old

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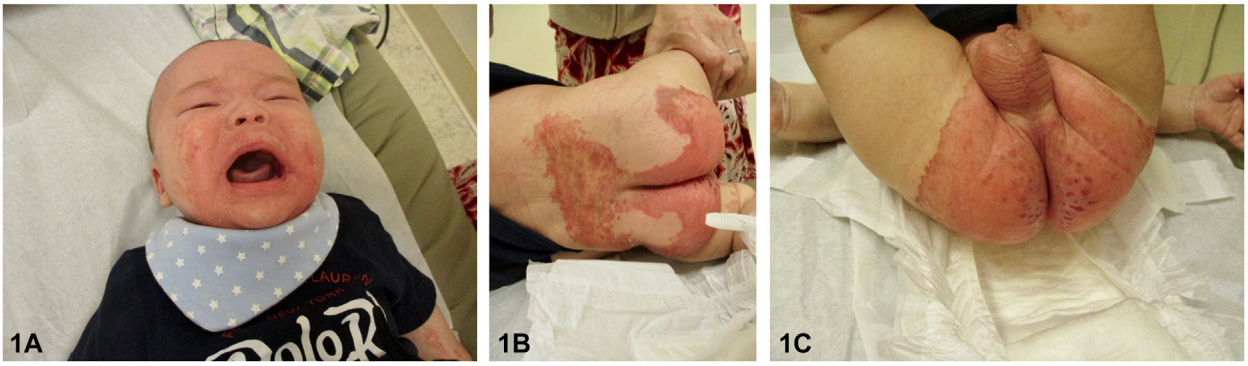

HISTORY

A 4-month-old previously healthy full-term, exclusively breastfed male infant presented with a rash on the face, arms, and diaper area for 4 weeks. The patient was previously treated by his pediatrician with nystatin cream, ketoconazole cream, hydrocortisone 2.5% ointment, and oral clindamycin without significant improvement. The family history was unremarkable. There were well-demarcated erythematous crusted plaques with focal erosions of the perioral, genital, and acral skin and scattered scaly erythematous plaques on the extremities (Fig 1, *A-C*). There was relative sparing of the upper cutaneous lip (Fig 1, *A*). Appropriate treatment resulted in rapid resolution in 2 weeks.

Question 1: Based on the clinical presentation and rapid improvement with treatment, what is the most likely diagnosis?

A. Acrodermatitis enteropathica

B. Jacquet erosive diaper dermatitis

C. Transient neonatal zinc deficiency (TNZD)

D. Infantile psoriasis

E. Langerhans cell histiocytosis

Answer:

A. Acrodermatitis enteropathica — Incorrect. While acrodermatitis enteropathica has similar skin findings, it classically presents in infants shortly after

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weaning due to impaired intestinal zinc absorption in the infant. This exclusively breastfed infant presented with rash while breastfeeding, indicating insufficient zinc levels in maternal milk.

B. Jacquet erosive diaper dermatitis — Incorrect. This describes a severe erosive rash in the diaper area that presents as well-circumscribed eroded or ulcerated papules and nodules. This would not account for the perioral and acral involvement.

C. TNZD — Correct. TNZD is a condition caused by a defect in maternal transfer of zinc into breast milk. Typical cutaneous lesions are characterized by sharply demarcated erythematous plaques that can become vesicular or eroded with peripheral scale crust and involve the perioral, acral, and anogenital skin. The perioral distribution often spares the upper lip, giving a U-shaped appearance. Concomitant symptoms often include diarrhea, irritability, and alopecia. TNZD improves rapidly with zinc sulfate supplementation at 3 mg/kg/day until weaning, with no zinc supplementation required following weaning.[1,2]

D. Infantile psoriasis — Incorrect. While psoriasis of the diaper area is also sharply demarcated, the scale is classically silver and micaceous. While intertriginous psoriasis may lack scale, the erosions as well as perioral, acral, and genital distribution and "peeling paint" scale are more characteristic of a nutritional deficiency.

E. Langerhans cell histiocytosis — Incorrect. Varied skin lesions can be seen in Langerhans cell histiocytosis including red-brown papules in seborrheic distribution, crusted papules on the palms and soles, and vesiculopustular lesions. Discrete eroded papules and petechiae would be expected as opposed to the sharply demarcated broad scaly plaques seen here.

Question 2: What lab values would be expected in the infant and infant's mother at the time of diagnosis?

A. Normal infant serum zinc levels, normal maternal serum zinc levels

B. Normal infant serum zinc levels, low maternal serum zinc levels

C. Low infant serum zinc levels, normal maternal milk zinc levels

D. Low infant serum zinc levels, low maternal milk zinc levels

E. Low infant serum zinc levels, low maternal serum zinc levels

Answer:

A. Normal infant serum zinc levels, normal maternal serum zinc levels — Incorrect. The infant serum zinc level is low. The maternal serum zinc level is normal.

B. Normal infant serum zinc levels, low maternal serum zinc levels — Incorrect. The infant serum zinc level is low. The maternal serum zinc level is normal.

C. Low infant serum zinc levels, normal maternal milk zinc levels — Incorrect. While the infant serum zinc level is low, the maternal milk zinc level is low. Of note, zinc concentrations in breast milk are normally much higher than those in maternal serum to meet an infant's requirements for normal growth and development.

D. Low infant serum zinc levels, low maternal milk zinc levels — Correct. The patient's serum zinc level was 31 mcg/dL (normal 56-134 mcg/dL). Laboratory evaluation for the patient's mother was notable for a normal serum zinc level of 79 mcg/dL (normal 60-130 mcg/dL) and an undetectable breast milk zinc level consistent with a diagnosis of TNZD.[3]

E. Low infant serum zinc levels, low maternal serum zinc levels — Incorrect. While the infant's serum zinc levels would be expected to be low, the maternal serum zinc level is normal in TNZD. The maternal mutation in the mammary epithelial zinc transporter, ZnT-2 gene, results in decreased secretion of zinc into breast milk. The ZnT-2 zinc transporter is critical for importing zinc into vesicles in highly specialized secretory cells.[3,4]

Question 3: A mutation in what gene is the cause of this condition?

A. Maternal SLC39A4 (solute carrier family 39 member 4) gene, encoding zinc transporter ZIP4

B. Infant SLC39A4 (solute carrier family 39 member 4) gene, encoding zinc transporter ZIP4[5]

C. Maternal SLC30A2 (solute carrier family 30 member 2) gene, encoding zinc transporter 2 ZnT-2[3,4]

D. Infant SLC30A2 (solute carrier family 30 member 2) gene, encoding zinc transporter 2 ZnT-2

E. Infant SLC45A2 (solute carrier family 45 member 2) gene, membrane-associated transporter protein (MATP)

Answer:

A. Maternal SLC39A4 (solute carrier family 39 member 4) gene, encoding zinc transporter ZIP4 — Incorrect. A mutation in the maternal SLC39A4 gene would be expected to result in acrodermatitis enteropathica of the patient's mother, when she was an infant.

B. Infant SLC39A4 (solute carrier family 39 member 4) gene, encoding zinc transporter ZIP4 — Incorrect. Autosomal-recessive mutation in the SLC39A4 (intestinal zinc transporter, Zip4) gene leads to impaired zinc absorption in the infant as seen in acrodermatitis enteropathica.

C. Maternal SLC30A2 (solute carrier family 30 member 2) gene, encoding zinc transporter 2 ZnT-2 — Correct. TNZD is caused by a maternal mutation in the SLC30A2 gene, a mammary epithelial zinc transporter, ZnT-2 gene, which results in decreased secretion of zinc into breast milk and TNZD. Recent studies suggest the prevalence of TNZD may be higher than previously thought, with various mutations in SLC30A2 identified.

D. Infant SLC30A2 (solute carrier family 30 member 2) gene, encoding zinc transporter 2 ZnT-2 — Incorrect. Mutation in the infant SLC30A2 gene would not cause TNZD of the patient.

E. Infant SLC45A2 (solute carrier family 45 member 2) gene, membrane-associated transporter protein (MATP) — Incorrect. Mutations in this gene are responsible for oculocutaneous albinism type 4 and do not impact zinc transport or absorption.

Abbreviations used:

SCL30A2: solute carrier family 30 member 2
SLC39A4: solute carrier family 39 member 4
TNZD: transient neonatal zinc deficiency
Zip4: zinc/iron-regulated transporter-like protein 4
ZnT-2: zinc transporter-2

Conflicts of interest

None disclosed.

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