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YOUR DIAGNOSIS

A 4-month-old boy with acrodermatitis enteropathica-like symptoms

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Abstract A 4-month-old boy was admitted for having diffuse eruption in the perianal region, legs, trunk hands, and face with failure to thrive, edema, hypoalbuminemia, and anemia. The patient was thought to have acrodermatitis enteropathica-like eruption due to malabsorption. The eruption completely resolved with enzyme supplement and proper nutrition and skin care.

Keywords Acrodermatitis enteropathica

Clinical information

A 4-month-old child was admitted with an eruption in the perianal region and around his mouth and then spreading to his arms and legs. He was born at full term to an uncomplicated pregnancy. The child was breast fed. There was no consanguinity between the parents. Diarrhea had developed a week prior to the skin eruption. On physical examination, his weight and height were 4,600 g (3–10p) and 57 cm (10–25p), respectively. He was restless and remarkable for generalized swelling, which was more pronounced in the lower extremities. Skin examination revealed a scaly macular and papular erythematous rash localized to the perineum, legs, trunk, hands, and face (Fig. 1). Flexural creases were largely spared, and the mucous membranes, hair, and nails were normal. Nikolsky's sign was negative. Laboratory tests are as follows: white blood cell count 16,800/mm^3 with 60% neutrophils, 4% bands, and 36% lymphocyte and positive toxic granulation. Hemoglobin was 6.6 g/dL and platelets 114,000/mm^3. Electrolytes were normal. Albumin was 1.6 g/dL and the total protein 3.2 g/dL. Proteinuria was negative. Chest roentgenogram was normal. His serum zinc level was 89 μg/dl (63–110), serum vitamin A level was 16.9 mg/dL (normal range: 30–60 mg/dL), and his serum vitamin E level was 0.63 mg/dL (normal range: 0.8–1.5 mg/dL). Blood, urine, and sputum cultures were sterile.

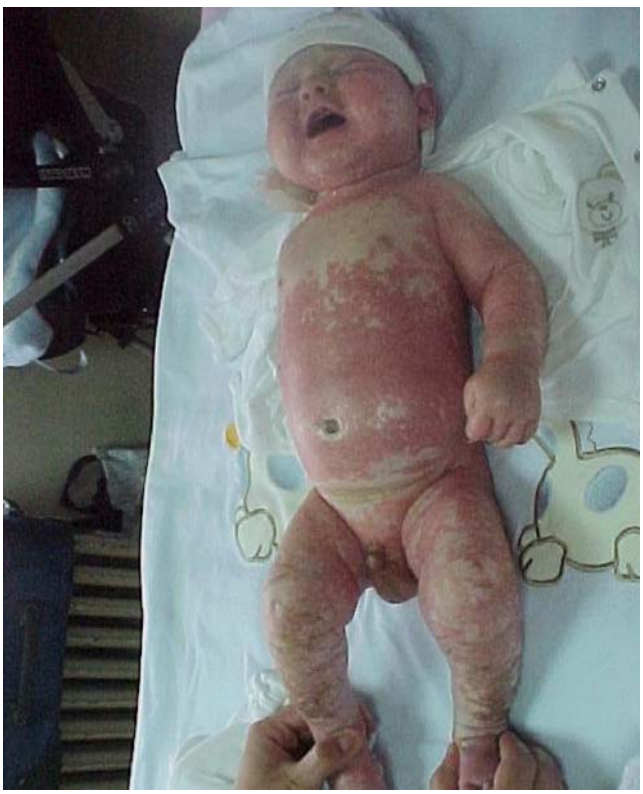

Fig. 1 Typical rash of acrodermatitis enteropathica-like erythematous desquamating plaques

What is your diagnosis?

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Sweat chloride was elevated at 63 mEq/L (normal <60, borderline: 60–90, elevated >90). Stool steatocrit was positive. The patient was suspected as cystic fibrosis (CF) and was commenced on pancreatic enzyme replacement. The patient received erythrocyte suspension and 20% albumin because of the anemia and hypoalbuminemia. While his serum albumin level was normal, his sweat chloride level was measured as 96 mEq/L. Because of hypovitaminous A and E, the patient was supported with multivitamins. Sulbactam-ampicillin was commenced because of the elevated white blood cell count, toxic granulation, and diffuse erosive skin lesions. Skin care such as moisturizers and zinc-based creams were administrated. The infant was fed with modified infant formula. The rash was resolved within 2 weeks of commencing pancreatic enzyme supplementation. At 12 months of age, he has achieved the 50th–75th percentile for both weight and height. Molecular genetic studies revealed a heterozygous 2183AA-G/- genotype, confirming CF.

Discussion

Cystic fibrosis is an autosomal recessive disease more commonly seen in Caucasians and presents with chronic lung disease, exocrine pancreatic insufficiency, and a high chloride sweat test. Up to 10% of patients with CF presented with hypoproteinemia, delayed development, anemia, and edema due to the kwashiorkor caused by pancreatic insufficiency. Cutaneous symptoms as a presenting sign in CF are rare [1, 5, 6, 12, 15]. The skin eruption is usually seen between the 3rd to 7th months of age and is seen about a month before edema and severe malnutrition. The skin eruption of CF is similar to acrodermatitis enteropathica [6–9, 12–14]. These skin lesions are distributed in the perioral, acral, and perineal areas in a symmetrical pattern. The initial eruption consists of erythematous, scaly papules, and progresses within 1–3 months to extensive, desquamating plaques. This dermatitis closely resembles acrodermatitis enteropathica, but is in some respects different because, as in other acrodermatitis enteropathica-like eruptions, the folds are unaffected and the mucous membranes and nails are always normal, as in our case [2, 8, 9, 14].

Acrodermatitis enteropathica is the clinical phenotype of Zn deficiency. Zinc is an essential trace element and it seems to play an important role in protein, carbohydrate, and vitamin A metabolism; growth and development; cell proliferation; and healing and tissue repair [2, 11]. The exact etiology of acrodermatitis enteropathica-like skin eruption is not known; however, it is postulated to represent the end product of multiple nutritional and metabolic derangements, resulting in a kwashiorkor-like state. Contributing factors appear to involve a complex interaction between the deficiencies of protein, zinc, and essential fatty acids (especially linoleic acid). In CF, exocrine pancreatic insufficiency can lead to zinc deficiency. Once zinc is absorbed, approximately 60% of the circulating zinc is bound to albumin and 30% is bound to macroglobulin. Therefore, deficiencies in albumin and/or protein can affect zinc transport and the zinc levels. Our patient showed markedly decreased serum protein and albumin levels with peripheral edema. This could explain why our patient with an acrodermatitis enteropathica-like eruption has normal levels of zinc [4, 6].

Patients with severe essential fatty acid deficiency may develop a rash clinically indistinguishable from that seen in malnourished patients with CF. The deficiency of linoleic and arachidonic acids are common in patients with CF, particularly those with malabsorption, but a rash rarely occurs. Due to the infrequency of rashes in CF patients with protein-energy malnutrition (PEM) however, essential fatty acid deficiency alone does not account for the presentation with rashes [6–9, 12–14]. Unfortunately, we could not study the essential fatty acids levels in our center. It is not only hypoalbuminemia, hypoproteinemia, zinc deficiency, and essential fatty acids deficiency, but also deficiencies of several micronutrients and many other factors that can be responsible for this clinical picture.

Malnutrition can result in false-negative and false-positive sweat chloride test results. False-negative sweat chloride tests are known to occur in patients with edema caused by hypoalbuminemia, and difficulties collecting adequate quantities of sweat are commonly experienced [3, 10]. At admission, the sweat chloride test for our patient was measured as 63 mEq/L. After the edema was resolved, the repeated sweat chloride level was measured as 96 mEq/L.

When CF presents with kwashiorkor, it is associated with high morbidity and mortality [1]. Early recognition and the instigation of appropriate nutritional supplementation and pancreatic enzymes is essential for improving the outcome, as in our case [6, 7, 12, 13, 15].

In conclusion, CF associated with malabsorption and insufficient nutrition will lead to hypoproteinemia, zinc deficiency, and fatty acid deficiency, which may cause skin eruptions similar to acrodermatitis enteropathica. CF should be kept in mind when the patient is associated with the acrodermatitis enteropathica-like skin eruptions, and sweat chloride tests should be repeated after the resolution of the edema.

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