

# A case of acquired acrodermatitis enteropathica in a 91-year-old man

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## Abstract

This report is a care experience of acrodermatitis enteropathica caused by inadequate zinc intake. The male patient is 91 years old, he had been fasting caused by recurrent acute pancreatitis, and intravenous nutrition lacking zinc. The case was based on multidisciplinary treatment, reviewing clinical data, and making a definitive diagnosis. Zinc supplementation is based on monitoring serum zinc levels, and for the skin wound condition to choose timely and effective dressing changes, life care, keep the wound dry, control the exudate seepage, and promote the healing of the patient's wound. With treatment and care, the patient's skin damage was brought under control and the prognosis was favorable.

## Keywords

zinc deficiency, acrodermatitis enteropathica, advanced age, care

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## Introduction

Zinc is a trace element found in the human body that is intimately involved in maintaining the integrity of a number of structural and regulatory proteins.<sup>1</sup> When various factors lead to zinc deficiency, the patients may present with three distinct symptoms, namely sparse or bald hair, intermittent diarrhea, and dermatitis (such as erythema, scaling, vesicles, ulceration, etc.) around the mouth and extremities. This clinical triad along with decreased serum zinc concentrations can be diagnosed as acrodermatitis enteropathica (AE). We present a case of AE in an elderly patient. Zinc deficiency has been reported to be more common in infants and young children, but very rare in adults and the elderly.<sup>2</sup>

## Case

We present a 91-year-old male with no significant family history of hereditary diseases or allergies. His initial diagnosis is ischemic stroke, Parkinson's disease, pulmonary infection, and anemia. Due to recurrent pancreatitis during hospitalization, the patient was further managed with fasting, anti-infection therapy, and parenteral nutrition support. The patient then developed intermittent diarrhea with mushy or watery stools after treatment. The patient's serum zinc concentrations were below the normal range, which led to the occurrence of severe skin lesions. Early stage of the disease, a skin eruption measuring 3.5 × 0.5 cm was found in the right groin with a scattered

surrounding red rash. After 11 days, extensive erythema with papules appeared on his mouth, nose, eyes, head, face, and back, and erosions with yellow exudate appeared on the groin, external genital, perianal area, and buttocks. After 3 days, the vesicles appeared as blisters and eczema-like changes, the skin around the fingernails was impregnated with whitish, and the epidermis was loose and easy to peel off. Eighteen days later, all 10 fingernails came off, and the fingertips showed moist redness (Figure 1). The lowest level of serum zinc was 0.2 μmol/L, and SLC39A4 gene mutation testing was not performed. A multidisciplinary team including geriatrics, dermatology, nutrition, infection control, and wound care personnel evaluated the case. The patient was diagnosed with acquired AE based on the appropriate criteria<sup>3–6</sup> and the absence of similar diseases or family history. The patient was started on an intravenous 60 mL drip of 0.9% sodium chloride solution with compound glycyrrhizin injection, Kabiven, and zinc therapy. The zinc deficiency was treated with zinc gluconate at a daily dose of 1.0 mg/kg/day until recovery. The patient was given

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**Figure 1.** (a) A  $3.5 \times 0.5$  cm skin ulcer, with scattered red erythema was observed on his right groin. (b) Extensive erythema with papules appeared on his face, groin, external genital, perianal area, and buttocks. (c) Ten fingernails came off.



**Figure 2.** The skin of his face, the groin, external genital, and perianal area became erythematous without exudation. The skin on the fingertips was healed.

skin care along with medications. First, clean disinfection of the wound was performed. Then, a medical-grade pure hypochlorous acid (NeutroPhase) wound-cleaning liquid was used for dressing. Its composition is a 0.01% hypochlorous acid solution and a 0.9% sodium chloride solution, which is used to moisten and clean skin and soft tissue infection wounds.<sup>7,8</sup> It can be directly sprayed onto the wound. After cleaning the wound, recombinant bovine alkaline fibroblast growth factor gel was applied to promote skin growth, it is a type of cell growth factor. It not only repairs mesoderm and endoderm cells but also possesses regenerative capabilities, enabling capillary regeneration, enhancing local blood circulation, and accelerating the healing of damaged wounds.<sup>9,10</sup> We also utilized fusidic acid ointment for its anti-inflammatory properties, and a halometasone/triclosan cream to alleviate allergy symptoms, and itching, and to safeguard the wound from infection, as well as to prevent the loss of electrolytes and proteins, change the dressing twice daily. Once exudation had decreased, the wound was cleaned and an external antibacterial ointment was applied. The wound was covered with a hydro-colloid dressing to promote the absorption of wound secretions

and accelerate healing, replacing it until it fell off on its own.<sup>11</sup> For skin lesions and nail loss on the extremities, a small home-made pillow was utilized to elevate both hands, which were disinfected using a 0.9% sodium chloride solution. Subsequently, recombinant bovine alkaline fibroblast growth factor gel was applied to facilitate wound healing. The five fingers were then gently wrapped in gauze, with the fingertips isolated to ensure their protection.

At the follow-up appointment, his zinc level was  $17.1 \mu\text{mol/L}$ . The skin lesions became erythematous without exudation. The rashes on his mouth, nose, eyes, head, face, and back resolved with pigmentation. The skin healed and no new skin lesions were observed. There was no recurrence after 2 months of discontinuing the medication (Figure 2).

## Discussion

According to the literature, acquired zinc deficiency is widespread, affecting about 17% of the global population<sup>12</sup>; AE is just one type of acquired zinc deficiency disorder. The precise incidence of AE is not known; the condition typically

affects infants, with an estimated occurrence of 1 in 500,000 live births, affecting approximately 1.5 million people worldwide.<sup>13–15</sup> The incidence in adults and the elderly is not discussed in the literature. The main diagnostic criteria for AE include the presence of the triad of periorificial and acral dermatitis, diarrhea, and alopecia. AE can be classified into genetic and acquired types,<sup>16</sup> both of which have similar clinical symptoms and manifestations. Genetic AE is mainly caused by mutations in the *SLC39A4* gene, resulting in impaired zinc absorption, while acquired AE is thought to develop for several reasons such as long-term parenteral nutrition, anorexia nervosa, digestive diseases, etc., resulting in zinc deficiency.<sup>17</sup> In addition, the presence of a decrease in the serum concentration of zinc<sup>3–6</sup> and symptom improvements with zinc supplementation were considered in the diagnosis. The detection of mutations in the *SLC39A4* gene can be used to differentiate inherited and acquired AE,<sup>18</sup> both of which are associated with zinc deficiency, emphasizing the need to increase zinc intake in patients with AE. However, the human body cannot synthesize zinc, and the blood zinc concentration in the elderly is generally low. Numerous studies indicate that zinc deficiency can lead to related skin diseases. Zinc is crucial for maintaining skin homeostasis and the formation of the epidermis, aiding in the prevention of skin diseases. Furthermore, zinc supplementation can enhance the immune system function of the elderly population.<sup>19,20</sup> Therefore, in accordance with the ESPEN practical short micronutrient guideline, the patient was administered oral zinc supplementation and had their dosage adjusted according to plasma or serum zinc levels,<sup>21</sup> until recovery.

During the administration of the drug, we utilized compound glycyrrhizin injection, which exhibits anti-inflammatory and anti-allergic properties, with minimal side effects and a high level of safety,<sup>22</sup> Kabiven supplements amino acids and nutrients. In the context of skin management, we consider that elderly skin tends to be loose with folds, sebum production decreases, skin becomes thinner, and dryness and itching may occur. The skin's resistance and tolerance diminish.<sup>23</sup> For a 91-year-old individual, prolonged bed rest and the presence of chronic diseases are risk factors that can exacerbate skin damage. Therefore, the use of zinc, rb-bFGF, and hydrocolloid dressings is recommended to promote skin healing and prevent more severe skin damage. The rb-bFGF is a type of cell growth factor. It not only repairs mesoderm and endoderm cells but also possesses regenerative capabilities, enabling capillary regeneration, enhancing local blood circulation, and accelerating the healing of damaged wounds. It yields better results in chronic wound healing. Water colloid dressings form an outer protective layer that is highly ductile and adhesive, allowing them to conform to the specific shape of the wound. They maintain a moist environment, which reduces tissue adhesion and provides an optimal setting for granulation tissue regeneration. In addition, the excellent sealing properties of water colloid dressings prevent external pathogenic microorganisms from invading the wound, ensuring a stable environment for granulation tissue

regeneration. This minimizes excessive stimulation and the closed environment aids macrophages in cleaning necrotic cell tissue, facilitating the repair and removal of factors that impede healing. In addition, we also provide life care, including keeping clothing and bed units clean; turning over every 2 h to prevent stress injury; cleaning the skin according to skin damage, gently applying ointment, and not rubbing hard.

## Conclusion

In this case report, the patient was an individual of advanced age. Due to recurrent pancreatitis during hospitalization, the patient required fasting and long-term parenteral nutrition support. As a result, the patient's serum zinc concentrations were below the normal range, which led to the occurrence of severe skin lesions and even nail loss, and was diagnosed as acquired AE. With treatment and care, the patient's skin damage was brought under control and the prognosis was favorable. Early recognition, intervention, and treatment are critical for a good long-term prognosis.

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## Statements and Declarations

### Ethical Considerations

Our institution does not require ethical approval for reporting individual cases or case series.

### Author contributions/CRedit

Y.S.: The study concept and design; writing of the manuscript; intellectual participation in the propaedeutic and/or therapeutic conduct of the studied cases. S.S.: The study concept and design; writing of the manuscript. Y.Z.: The study concept and design; effective participation in the research guidance; critical review of important intellectual content; final approval of the final version of the manuscript. Y.C.: Data collection; intellectual participation in the propaedeutic and/or therapeutic conduct of the studied cases.

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### Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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