

## Acquired Zinc Deficiency with Concomitant Deficiencies of Vitamin A, B1, and B6

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# Acquired Zinc Deficiency with Concomitant Deficiencies of Vitamin A, B1, and B6

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**History of Present Illness:** The patient presents at 25 weeks estimated gestational age with a five day history of a pruritic and painful rash. The rash began in the genital region and spread centrifugally to her legs and is associated with lower extremity edema. She was admitted to the hospital two weeks prior with edema and proteinuria secondary to poor nutritional status in the setting of pregnancy. Associated systemic symptoms included nausea, vomiting, and poor appetite. She has poor access to financial resources.

**Medical History/Surgical History:** Polyarticular juvenile rheumatoid arthritis with ambulatory dysfunction, bipolar disorder, depression

**Medications:** Vitamin C, calcium carbonate-vitamin D3, ferrous sulfate, medical marijuana, potassium chloride, torsemide, rituximab

**Previous Treatments:** vitamin A and D ointment, clotrimazole-betamethasone 1%/0.05% lotion

**Current Treatment:** Triamcinolone 0.1% cream, vitamin B6, zinc sulfate, prenatal vitamins

**Physical Examination:** Generalized xerosis. Erythematous, scaly plaques on the medial thighs, legs, abdomen, and posterior ankles with serous drainage. Erythematous and inflamed lips. Vesicles on the anterior superior left anterior thigh. Gluteal cleft with desquamation over an erythematous patch. Lower extremities are edematous. Vulva is edematous and erythematous.

**Laboratory Data:** Zinc 24.8 ug/dL (60-120), Vitamin A retinol free <0.06 mg/L (0.3-1.2), vitamin B1/thiamine <2 mmol/L (4-15), vitamin B6/pyridoxine 6.7 mmol/L (20-150), albumin 1.6 g/dL (3.5 - 4.8), protein 3.4 g/dL (6.3 - 8.3), potassium 3.3 mmol/L (3.5-5.2), calcium 7.2 mg/dL (8.5-10.1), bilirubin 1.2 mg/dL (0.2-1.0), alkaline phosphatase 302 U/L (35-120), hemoglobin 9.8 g/dL (11.5-14.5), hematocrit 28.7% (35-43), WBC 12.6 thou/cmm (4-10), RBC 3.33 mill/cmm (3.7-4.7). Vitamin B2, vitamin B3/niacin, vitamin B12, vitamin C, rest of CMP and CBC WNL

**Studies:** Echocardiogram without evidence of cardiac failure.

**Biopsy:** *Health Network Laboratories* (S19-60124, 11/20/19) Right anterior proximal thigh: "Patchy vacuolation and pallor of the upper epidermis, overlying foci of parakeratosis, papillary dermal and dermal edema with superficial and deep, predominantly perivascular, lymphohistiocytic inflammation. PASD histochemical study is negative for pathogenic yeast/fungal organisms."

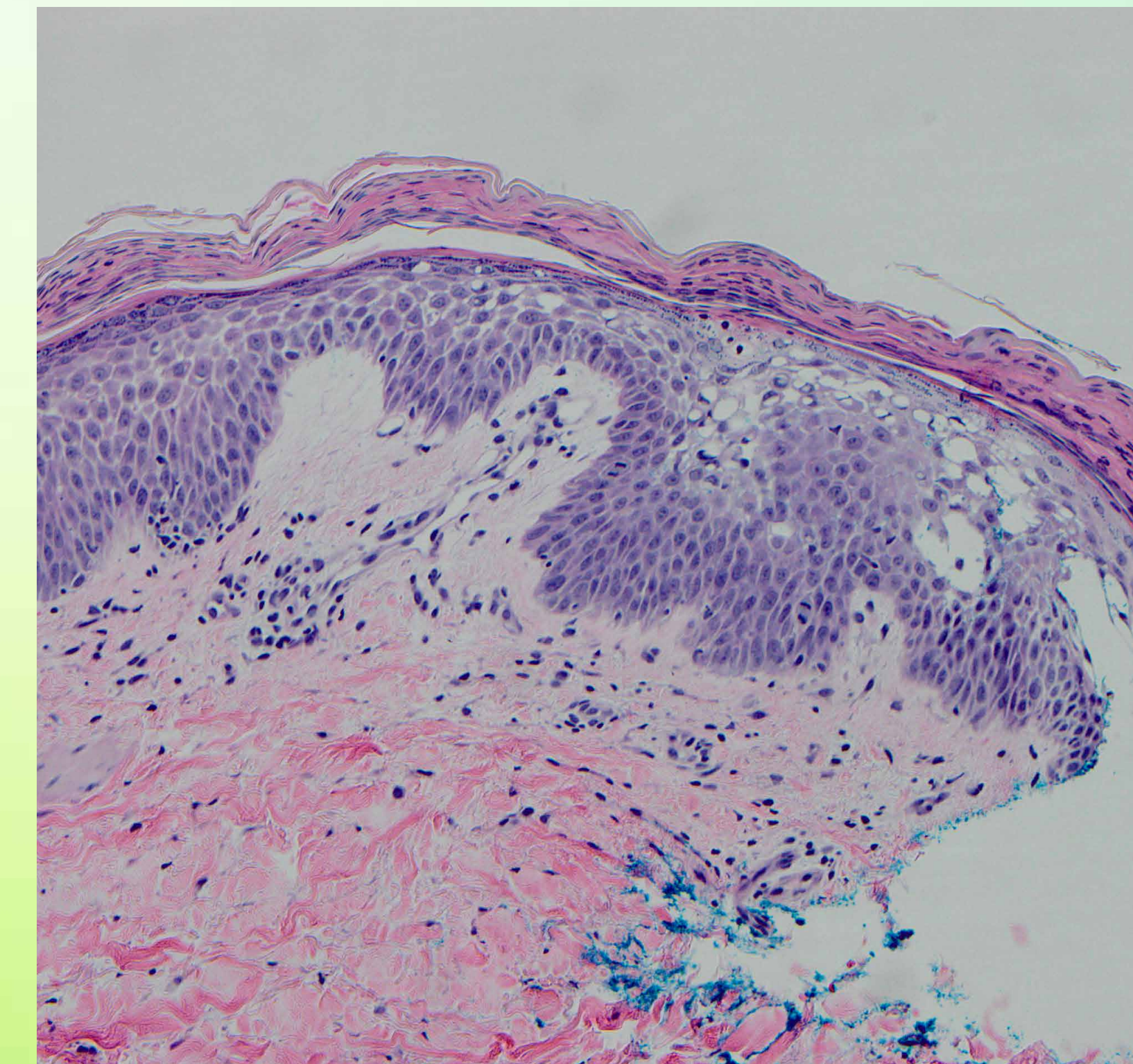
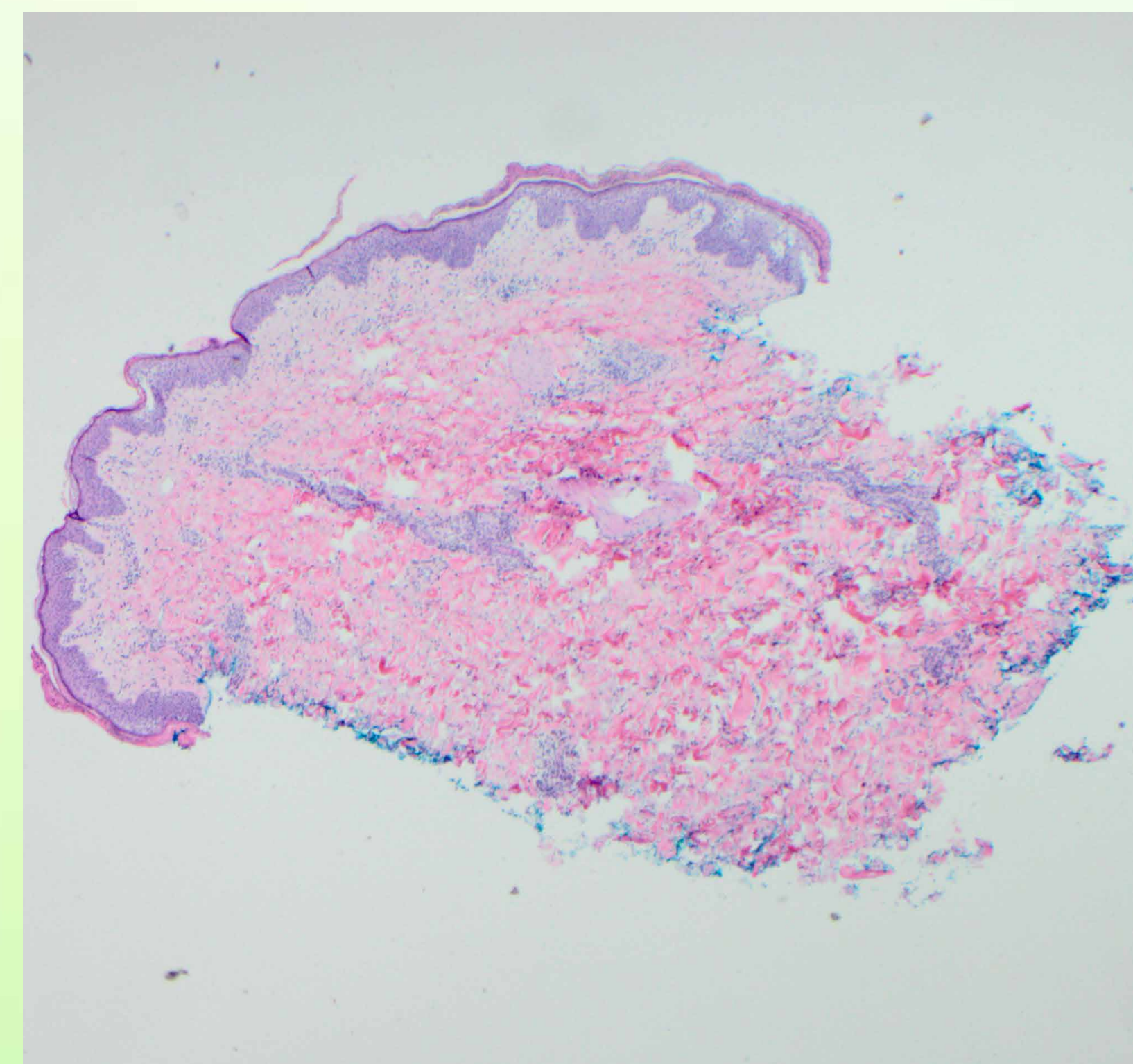
**Reason for Presentation:** Interest



**Figure 1.** Gluteal cleft with desquamation over an erythematous patch.



**Figure 2.** Erythematous, scaly plaques on the left medial thigh with edema and serous drainage.



**Figures 3 and 4.** (H&E 4x, 20x) Right anterior proximal thigh biopsy shows patchy vacuolation and pallor of the upper epidermis, overlying parakeratosis, papillary dermal and dermal edema with superficial and deep, predominantly perivascular, lymphohistiocytic inflammation.

## REFERENCES

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## Diagnosis: Acquired Zinc Deficiency with Concomitant Deficiencies of Vitamin A, B1, and B6

Nutritional deficiencies are uncommon in most developed nations, but some patient populations are at increased risk including infants, pregnant women, those with restricted diets, alcoholics, and those with liver disease. Additionally, patients of poor socioeconomic status, on dialysis, on certain medications, or with a history of malabsorption or gastrointestinal surgery are also at risk. Patients often present with multiple nutritional deficiencies which can result in heterogeneous morphologies.

Zinc is an essential trace element that is required for metalloproteinases and transcription factors to function in wound repair, immune responses, and reproduction. It also has antioxidant properties against UV radiation damage. Inherited zinc deficiency, known as acrodermatitis enteropathica, is due to a mutation in a zinc uptake protein and has similar clinical features as acquired zinc deficiency. Cutaneous findings include periorificial, acral, and anogenital dermatitis. Alopecia, nail dystrophy, conjunctivitis, stomatitis, and angular cheilitis may also be seen.

Vitamin A is a fat soluble vitamin necessary for protein synthesis in the eye. Vitamin A also enhances the immune system and keratinocyte function. Vitamin A deficiency manifests as phrynoderma (follicular papules with central keratotic plug favoring extensor surfaces), fragile hairs, and generalized xerosis.

Vitamin B1 (thiamine) is an essential cofactor involved in NADPH synthesis, macromolecule aggregation, and neural function. Deficiency of B1, known as beriberi, can be "wet" or "dry." Wet beriberi presents with cardiac failure. Dry beriberi presents with primarily neurological symptoms. Dermatologic findings of wet beriberi are edematous skin with subsequent breakdown and glossitis.

Vitamin B6 (pyridoxine) serves as a cofactor for more than 140 enzymes. While uncommon, cutaneous findings of vitamin B6 deficiency include eczematous or seborrheic dermatitis, angular cheilitis, stomatitis, conjunctivitis, glossitis, and intertrigo.

The histopathologic findings of nutritional deficiency characteristically are epidermal cytoplasmic pallor, vacuolization, ballooning degeneration, and subsequent confluent necrosis of keratinocytes in the stratum spinosum and granulosum. Other findings can include confluent parakeratosis associated with hypogranulosis, neutrophilic crust, and scattered dyskeratotic keratinocytes.

Treatment includes replacing deficient nutrients and helping to connect patients with appropriate multidisciplinary care teams and community resources.