

CLINICAL VIGNETTE

Scurvy in a Hemodialysis Patient

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Case Description

A 35-year-old woman presented with fatigue, dyspnea, and a new rash. One week prior to presentation, the patient reported onset of progressive dyspnea on exertion. At her last hemodialysis session, her hemoglobin had decreased to 7 g/dL from her baseline of 9 g/dL. She denied orthopnea, lower extremity edema, infectious symptoms, or bleeding. Past medical history includes congenital renal dysplasia complicated by end stage renal disease (ESRD) on hemodialysis, vitamin B12 & A deficiency, folate deficiency, and chronic macrocytic anemia. She also reported a new pruritic leg rash three days prior.

Her physical exam was notable for perifollicular erythema and petechiae with corkscrew hairs on her legs (Figure 1 A&B). Her mouth had mild gingival erythema. Labs were notable for a macrocytic anemia with hemoglobin of 5 g/dL and an undetectable vitamin C level.

Based on the patient's dermatologic findings, labs, and anemia, she was diagnosed with vitamin C deficiency, commonly referred to as scurvy. Initially, there was concern for malabsorption given the patient's multiple nutritional deficiencies, but upper endoscopy was only notable for mild erythema in the stomach without histological evidence of malabsorption on stomach and duodenal biopsies. The patient was discharged on oral vitamin C. On follow-up several months later, her rash and gingival bleeding had resolved, and her macrocytic anemia had improved.

Discussion

Vitamin C is a potent antioxidant with multiple effects. It has been implicated in cardiovascular health, bone remodeling, red blood cell production, and psychological health, among others. Vitamin C deficiency can range anywhere from mild with no symptoms to a severe deficiency, commonly known as scurvy, which can lead to death. It was first recognized in the 15th century and became well-known due to its high prevalence amongst seafarers.¹ However, it is now frequently overlooked and thought of as an uncommon condition in wealthier countries.

Scurvy is characterized by a state of low vitamin C that is diagnosed based on clinical features, dietary history, and

resolution of symptoms with supplemental vitamin C. Common symptoms of scurvy include anemia, weakness, and fatigue.^{2,3} On physical exam, findings include frequently petechiae, perifollicular hemorrhage, and gingival bleeding. Corkscrew hairs are common and result from hyperkeratosis of hair follicles and impaired keratin cross-linkage, leading to their characteristic appearance seen in our patient. Another potential finding is the Rumpel-Leede sign, a well-demarcated petechial rash distal to an area of pressure caused by a tourniquet or sphygmomanometer.⁴ It results from conditions that have increased capillary fragility.

Globally, vitamin C deficiency is common, although severe deficiency is uncommon in middle to higher income countries. A study of over 5600 adults over age 60 in India revealed a deficiency of 74% in North India and 46% in South India.⁵ In contrast, a population study of over 22,000 English adults reported a deficiency rate of 1.4%. In the United States, the National Health and Nutrition Examination Surveys (NHANES) study of over 4,400 adults found 8.4% were vitamin C deficient. Vitamin C comes mainly from fresh fruit and vegetables and cannot be produced in the body. Deficiency of this vitamin is more prevalent in lower income groups where there is less consumption of fresh produce. It has been found in higher numbers in men, those with obese, pregnancy, or breastfeeding.⁶ At-risk patient groups, including age, psychiatric comorbidities, substance abuse, malabsorption, cancer, unstable housing, and renal failure on hemodialysis.⁷

Hemodialysis patients have plasma vitamin C levels <10 $\mu\text{mol/L}$ compared to normal levels of 30-60 $\mu\text{mol/L}$.⁴ This deficiency occurs via several mechanisms. First, vitamin C and other water-soluble vitamins are eliminated from the blood during dialysis. A single session of hemodialysis can cause a 50% drop in the vitamin C level. Patients with ESRD also have limited intake of dietary vitamin C by avoiding foods high in potassium, such as fruits and vegetables.^{3,7} They also may have decreased appetite due to a persistent catabolic state. Finally, they are in an inflammatory state, which leads to increased oxidative stress and consumption of vitamin C.

Not only is prevalence of vitamin C deficiency underestimated, but many of its symptoms can overlap with common renal

failure symptoms such as anemia, fatigue, and shortness of breath, which results in underdiagnosis of vitamin C deficiency. While scurvy is a rare condition in the developed world, hemodialysis patients are at increased risk even without scarcity of nutritional resources.

Conclusions

Scurvy, a severe form of vitamin C deficiency, is uncommon in the United States in the era of increased access to fresh produce. Populations with elevated risk include those who are institutionalized, have psychiatric illness, cancer, gastrointestinal malabsorption and ESRD. Dialysis removes vitamin C, and patients receiving dialysis often have symptoms that overlap with scurvy, leading to underdiagnosis. Further attention should be paid to taking a dietary history and screening patients for nutritional deficiencies who are at risk.



Figure 1A. Petechiae, perifollicular hemorrhage and corkscrew hairs are characteristic of vitamin C deficiency.

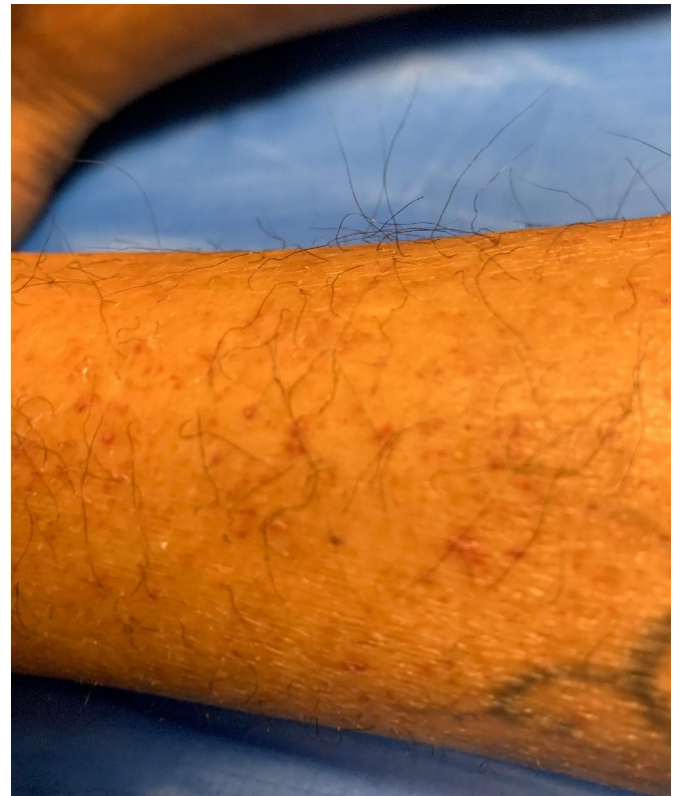


Figure 1B. Petechiae, perifollicular hemorrhage and corkscrew hairs are characteristic of vitamin C deficiency.

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