Scurvy: An Ancient Disease of the Present

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Abstract
Vitamin C deficiency, which leads to scurvy, is not a disease of the past, but a disease that occurs more and more often in developed countries in certain population groups, such as malnourished, alcoholic or elderly patients, those of low-income or patients with known psychiatric disorders or malabsorption syndromes. We present a case of a 67-year-old male patient who presented to our emergency department with a gradual cognitive impairment, inability to stand and walk and a non-palpable purpuric rash. After an extensive diagnostic workout, the clinical manifestations were attributed to low vitamin C levels and the patient showed gradual and complete recovery with replenishment of the deficiency. We emphasize the importance of high suspicion for an early diagnosis and immediate treatment to avoid serious and potentially fatal complications arising from this clinical entity.

Introduction
Vitamin C plays a major role in a number of functions of the human body, such as the formation of collagen, the absorption of minerals such as iron, the synthesis of neurotransmitters, while also acting as an antioxidant. Since humans are unable to produce ascorbic acid from glucose due to the lack of the enzyme L-gulonolactone oxidase, they are completely dependent on dietary intake of Vitamin C.

Scurvy, the nutritional deficiency disease cause by the lack of Vitamin C or ascorbic acid, has been prevalent throughout much of human history. The first reports of a disease with similar symptoms already exist in ancient Egypt (1550 BC) and in ancient Greece by Hippocrates (400 BC), however it has mainly been associated with the voyages of the great seafarers of the 15th and 16th centuries [1-3]. Nowadays, scurvy occurs only sporadically in adults in developed countries and is mainly encountered in malnourished alcoholic patients, isolated elderly patients, patients with malabsorption syndromes or psychiatric disorders [4].

Although the diagnosis and treatment of scurvy is easy, lack of clinical suspicion by physicians, especially in developed countries where this disease is thought to be rarely encountered, can lead to delay in prompt diagnosis and treatment with an impact on the outcome of these patients.

Case Description
A 67-year-old male patient, with a prior history of alcohol abuse, presented to our hospital’s emergency department with a gradual impairment of mental functions, especially memory, lasting two months and inability to stand and walk lasting two days before his admission. He had a history of hypothyroidism and colon neoplasia, with secondary liver involvement, for which he had undergone right colectomy and chemotherapy two years ago, with recent staging negative for active disease. He was also an active smoker, without any known allergies.
The patient was afebrile, normotensive, with normal pulse oximetry. Physical examination revealed a mildly enlarged liver, friable gums, a non-palpable purpuric rash in both legs and a swollen left knee with redness and tenderness. Neurologic examination revealed that the patient was alert, disoriented in time and space, with normal muscle strength, normal tendon reflexes, without focal neurological signs. He could only stand and walk a few feet with assistance.

The laboratory data on admission were as follows: hemoglobin: 13.6 g/dL; hematocrit: 41.6%; mean corpuscular volume: 87.6 fL; white blood cells: 5.360/μL; platelets: 160,000/μL; C-reactive protein: 102 mg/L; aspartate aminotransferase: 22 IU/L; alanine aminotransferase: 8 IU/L; lactate dehydrogenase: 186 IU/L; serum total protein: 5.39 g/dL; albumin 2.99 g/dL; international normalized ratio: 1.17; uric acid: 9 mg/dL; serum total bilirubin: 0.88 mg/dL; serum sodium: 141 mEq/L; potassium: 3.9 mEq/L; calcium: 9.5 mg/dL; phosphorus: 3.8 mg/dL; magnesium: 1.9 mg/dL; urea: 34 mg/dL; creatinine: 0.97 mg/dL; fasting blood glucose: 99 mg/dL; serum iron: 43 mg/dL, ferritin: 52.9 ng/dL; folic acid: >20 ng/mL; vitamin B12: 381.8 pg/mL. Multiple blood and urine cultures were sterile and serologic tests for HBV, HCV, HIV, CMV, VZV, HSV were negative.

Brain Computed Tomography (CT) with IV contrast did not show hemorrhage, ischemia or tumor. A lumbar puncture was carried out with normal CSF opening pressure, clear color, total protein: 654 mg/L, glucose: 46 mg/dL, four white blood cells (lymphocytes) and negative CSF cultures. A brain MRI showed diffuse nonspecific leukoencephalopathy lesions and small focal intracerebral hemorrhages. An Electromyography (EMG) showed findings consistent with advanced sensorimotor neuropathy, especially in both legs, and an electroencephalogram (EEG) was abnormal, consistent with severe diffuse encephalopathy. Vitamin C was measured and found to be 3.2 mg/L (normal values: 6-20mg/L). Intravenous supplementation of 1gr of Vitamin C per day was immediately started and the patient showed gradual clinical improvement, as his neurological symptoms diminished after two days of treatment, with normal gait and improvement of mental functions, and the rash and friable gums were gone after one month of treatment.

**Discussion**

Scurvy is a preventable nutritional deficiency disease caused by poor intake or malabsorption of Vitamin C, commonly found in fruits and vegetables. Nowadays, it is found increasingly in developed countries in populations with a low socio-economic status. For example, the prevalence of Vitamin C deficiency in a national study in the US was found to be 7.1% and smokers and low-income persons were at increased risk [5]. In the UK, 25% of men and 16% of women of low-income had Vitamin C levels indicating deficiency [6].

The earliest symptoms of scurvy in adults, appearing 60-90 days after a low Vitamin C diet, include fatigue and weight loss and are usually non-specific [7,8]. Dermatological manifestations, including hyperkeratosis, petechiae or purpura, ecchymoses and perifollicular hemorrhage, develop after about 5 months and are more commonly found in the lower extremities because of hydrostatic pressure [8]. Musculoskeletal manifestations are also frequent in scurvy and the disease can mimic many rheumatological disorders. Arthralgias and myalgias, as well as edema, are common and affect mainly the ankle and knees, while the purpura may become palpable due to the underlying hyperkeratosis and mimic vasculitis [9]. ESR and CRP levels may also be elevated in these patients, possibly due to a systemic inflammatory response, making it more difficult to differentiate scurvy from rheumatologic disorders [10]. Also, Vitamin C deficiency is a known cause of spontaneous hemarthroses, presenting with swollen and painful joints, and as a result inflammatory or septic arthritis should be ruled out [11].
Vitamin C deficiency can also lead to a variety of neuropsychiatric complications. Cognitive impairment, depression and/or irritability are common and non-specific symptoms, while hypochondriasis has also been described in case reports [12]. If left untreated, it usually leads to progressive neuropathy with difficulty to stand and walk, or even epileptic seizures, possibly due to brain microhemorrhages [13].

Scurvy can be fatal in extreme cases and death most commonly results from infection, hemorrhage, or even multiorgan failure [14]. Coexistence of other nutritional deficits, such as zinc, iron, folate and Vitamin B, should be investigated and treated. The relationship between Vitamin C and iron absorption and metabolism is well known and has been extensively examined in literature [15].

Conclusions
This case report highlights the fact that scurvy is not a disease of the past, but can also be presented in developed countries nowadays. The clinical suspicion for scurvy should be raised in patients suffering from malabsorption syndromes, alcoholism, psychiatric disorders or of extreme poverty, presenting with neurological manifestations, spontaneous bleeding and/or non-palpable purpura.

Conflicts of Interest
The authors report no conflicts of interest.

Authors Contribution
All the authors equally contributed to the management and presentation of this case report.

References