

Scurvy is Back

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ABSTRACT

BACKGROUND AND OBJECTIVE: Scurvy, caused by vitamin C deficiency, first described by Hippocrates, is known to many as 'The Pirates' Disease'. Although a disease rarely acknowledged in modern medicine, we present 2 cases of elderly gentlemen found to have scurvy, who improved significantly on treatment.

METHODS: This study presents a case report of 2 patients undergoing rehabilitation at Karin Grech Hospital in Malta, noted to have signs and symptoms of vitamin C deficiency. Vitamin C levels were found to be low and thus supplementation was administered.

RESULTS: After a few weeks, a significant improvement was noted in level of frailty, mood, bleeding tendency, and gum health.

CONCLUSIONS: The modern doctor must keep this ancient disease in mind, as it presents insidiously with debilitating repercussions, particularly in older people who are at a higher risk. It is easily treatable once detected.

KEYWORDS: Vitamin C, ascorbic acid, scurvy, nutritional deficiency malnutrition

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Case Reports

The first case is an 80-year-old gentleman (patient 1), with a history of hypertension and ischaemic heart disease, presented for rehabilitation after a stroke. He was cachectic, with muscle atrophy, joint stiffness, thin skin which broke and bled, and widespread bruising. Despite minimal neurological deficit, he was extremely weak and became bedbound months before his stroke. He lived at home with his wife who had carer burnout, complicated by psychiatric illness, and rarely cooked meals. Due to this history of malnutrition, vitamin C levels were tested and found to be 0.11 mg/dL (0.5–1.5 mg/dL). He was started on ascorbic acid 250 mg twice a day. Within a few weeks, he was more alert, his mood improved, he was able to mobilise independently with a frame, and bruising subsided.

The second case (patient 2) was a 61-year-old gentleman, heavy alcoholic, with a history of chronic obstructive pulmonary disease. He presented with an upper gastrointestinal bleed secondary to gastric ulceration and was treated with proton pump inhibitors. He had limited food intake, preferring to spend his money on alcohol. He lived alone with no social support. On examination, he was emaciated, with multiple bruises, poor dentition with bleeding gums, and telangiectasia. Blood tests showed low levels of vitamin C (0.21 mg/dL). His gamma-glutamyltransferase was raised, but there were no other signs of liver failure.

Discussion

Ascorbic acid is the enolic form of an alpha-ketolactone. It is a reversible reducing agent, with a key role in reducing molecular

oxygen, thus acting as an antioxidant. It consequently exerts an effect on many other compounds including copper, iron, and folic acid.¹

It inhibits low-density lipoprotein oxidation, hence reduces atherosclerosis and improves arterial stiffness, lipid profiles, and endothelial function. Recent research suggests that deficiency in vitamin C is associated with a higher risk of mortality from cardiovascular disease.^{2,3}

Ascorbic acid is involved in synthesis and the maintenance of the collagen triple helix structure. Its deficiency results in decreased blood vessel integrity with an increased bleeding risk.⁴ This can explain the presentation in patient 2 with a non-variceal gastrointestinal bleed and extensive bruising, despite normal international normalised ratio and platelet level, and no anticoagulant or antiplatelet use.

Vitamin C is involved in wound healing, dentition (hence the poor dentition in patient 2),^{3,5} and osteoblast and fibroblast function. It affects neurotransmitter synthesis, prostaglandin metabolism, and fatty acid transport.¹

Ascorbic acid is not synthesised by the body but its supplementation depends on the consumption of food high in vitamin C.⁶ It is absorbed in the distal small intestine through an energy-dependent active transport process. Renal excretion regulates its blood concentrations and excess amounts are filtered by the glomeruli and reabsorbed via the tubules to a predetermined threshold. The greatest concentrations of ascorbic acid are found mainly in the pituitary, adrenals, brain, leucocytes, and the eye.¹

Stores become depleted in 1 to 3 months. Symptoms of scurvy present when plasma concentration of ascorbic acid is



less than 0.2 mg/dL (11 µmol/L).⁷ This is usually calculated from plasma and leucocyte vitamin C levels. High-performance liquid chromatography can evaluate both reduced ascorbic acid and oxidised dehydroascorbic acid levels.¹

Scurvy presents with follicular hyperkeratosis, coiled hairs, petechiae, bruising, gingivitis, dental caries, stiff joints, painful muscles, dry skin, and impaired wound healing.⁸ Patients feel fatigued, with generalised malaise, and depression. Symptoms may progress to fever, hemarthrosis, subperiosteal bleeding, and vasomotor instability, eventually leading to death.^{1,9,10} Magnetic resonance imaging shows sclerotic and lucent metaphyseal bands, with periosteal reaction and adjacent soft tissue oedema.^{1,8}

Patient 1 was significantly frail. However, with good nutrition and vitamin C supplementation, he improved from a Clinical Frailty Scale level 8 to 6.¹¹ His fatigue and low mood also improved after vitamin C supplementation.^{12,13}

Treatment is a diet rich in vitamin C, such as citrus fruits, tomatoes, and potatoes. This food must not be exposed to oxidative conditions during its preparation, as the ascorbic acid will be destroyed. Administration of 300 to 1000 mg of ascorbic acid daily for 1 month is necessary where diet alone is insufficient.¹

The recommended dietary allowance is 90 mg/d for men and 75 mg/d for women. Smokers have increased oxidative stress and metabolic turnover of vitamin C and therefore need 35 mg/d more than the recommended dietary allowance.⁷ Pregnant and lactating women and older people require up to 120 mg/d.⁷ Large doses of vitamin C, however, cause diarrhoea, abdominal bloating, and calcium oxalate kidney stone formation.¹ Hence, it is important to titrate doses of vitamin C according to individual patient needs.

The prevalence of vitamin C deficiency varies across the world, being as high as 73.9% in northern India¹⁴ and 7.1% in the United States.¹⁵ It is found more commonly in areas of low socioeconomic status in developed countries, with an estimated 25% of men and 16% of women in the low-income population of the United Kingdom being deficient in vitamin C (<11 µmol/L) and a further 20% of the population being vitamin C deplete (11–28 µmol/L),¹⁶ whereas 95% of homeless people on the streets of Paris are deficient in vitamin C.¹⁷ People who are elderly,¹⁸ men, alcohol abusers, have an eating disorder, iron overload, undergoing haemodialysis, or after gastric surgery are especially at risk of deficiency.^{1,18,19} Newborns and infants are protected from deficiency of ascorbic acid which is provided from breast milk.¹

These case reports emphasise that scurvy is not a disease of the days-of-old but is present in today's society, including in

developed countries. It can easily be missed, yet is easily treated. Therefore, a high level of suspicion should be kept in groups at high risk of malnutrition.

Author Contributions

CAC and SV identified the cases, conducted the research and wrote the report. PF supervised and revised the final version.

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