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Problems of Diagnosis and Management of a Patient with Suspected Scurvy: A Case Report

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Abstract — Vitamin C is a substance needed by the human body to maintain metabolic function. Scurvy is a disease caused by vitamin C deficiency. This disease is often forgotten in the era of modern medicine. Vitamin C (ascorbic acid) plays a role in the formation of type IV collagen. Type IV collagen is an essential component of the walls of blood vessels, skin, and the basement membrane zone that separates the epidermis from the dermis. Three things must be met to diagnose scabies, namely a history of insufficient vitamin C intake, the presence of clinical manifestations typical of scabies, and biochemical indices, namely low levels of vitamin C in the blood (serum, white blood cells, and whole blood) and low urinary excretion levels. In patients with scabies who already have clinical manifestations, immediate vitamin C replacement is needed. A case of a male patient with suspected scabies with various clinical manifestations has been reported who improved with direct vitamin C replacement therapy. Early diagnosis and appropriate treatment can improve the prognosis in patients with scabies.

Keywords — Collagen; Scurvy; Vitamin C.

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INTRODUCTION

Vitamin C is a water-soluble vitamin needed by the human body to maintain metabolic functions. It plays a vital role in collagen synthesis, accelerating the wound healing process, accelerating the metabolism process, and acting as an antioxidant. Humans cannot synthesize vitamin C by themselves because they do not have gluconolactone oxidase, an enzyme needed for vitamin C biosynthesis. To meet the body's vitamin C needs, humans need vitamin C intake from outside [1].

Scurvy is a disease caused by vitamin C deficiency. This disease is often forgotten in the era of modern medicine. Scurvy is a vitamin C deficiency that has historically been associated with sailors due to disruption of collagen synthesis, which causes bleeding, skin disorders, and mouth disorders. Lack of consumption of foods rich in vitamin C can cause severe conditions. Scurvy itself has broad clinical manifestations that can affect various organs. Early diagnosis and appropriate and earlier therapy can improve a better prognosis [2,3].

In this case report, a patient with a crew background with various clinical manifestations leading to scurvy will be discussed. This case report can be used as a reference and add insight into dealing with scurvy events in the future. This study aims to identify and analyze the diagnostic process of patients with suspected scurvy, including clinical symptoms, medical history, and supporting examination results.

CASE PRESENTATION

A 23-year-old male patient from the Sumba tribe in East Nusa Tenggara, unmarried, came to the emergency room with complaints of weakness one month ago, worsening one week before admission. The weakness increased when doing activities

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and was said to decrease when resting. The weakness was said to occur in the entire body, not just on one side. The patient also complained of frequent dizziness that was not accompanied by a spinning sensation.

The patient complained of swelling in his gums, which he began to notice one month ago. The swelling occurred in all parts of the gums. The patient also complained of bleeding gums that happened every time he brushed his teeth. Bleeding gums were also said to have been felt since one month ago. In addition to bleeding gums, the patient also said he often saw blood in his stool after defecating, which had been felt for the past three weeks.

The patient complained of blackish spots appearing on both of his lower extremities. This complaint occurred approximately 1 month ago. The blackish spots could not disappear and continued to increase. The patient also felt pain in both legs for the past month; the legs felt cramped, and it was sometimes difficult to move. In addition, the patient also complained that there were purple spots that appeared under the patient's nails, which were noticed 1 month ago.

The patient complained of shortness of breath for one month, with a productive cough and white to yellow sputum. There were several episodes accompanied by blood in the sputum. The fever was said to be intermittent, and chest pain was absent. The patient said there had been weight loss since one month ago, but it was not known how many kilograms the loss had occurred.

The patient has a crew background; the patient has been sailing for 8 months, and the daily diet only consumes rice and fish and never consumes fruits or vegetables. History of vitamin supplementation consumption while sailing was denied. There was no history of food allergies. The patient refused to have a history of the same disease in the family. The patient has a history of having more than one sexual partner. The patient denied a history of drug abuse, alcohol, or smoking. A history of hypertension, diabetes mellitus, and heart disease was rejected by the patient.

On physical examination, a weak general condition was found, compos mentis consciousness with Glasgow Coma Scale (GCS) E4V5M6, with a weight of 63 Kilograms and a height of 160 centimeters. Body mass index (BMI) 24.6 Kg/m2, Blood pressure 110/70 mmHg, pulse 100 times per minute, respiration 20 times per minute, temperature 36.7 degrees Celsius, peripheral oxygen saturation 99% room air. In patients, found anemic conjunctiva, icteric sclera (-), gum hypertrophy and blood, abdomen within normal limits, lower extremities minimal edema on both legs, and there are hyperpigmentation plaque lesions, positive xerosis, multiple nodules, smooth edges bilateral, there is a black color on the tips of the nails of both hands. On digital rectal examination, blood is in the feces.

Fig. 1. Clinical manifestations of the patient. (a) Swelling of the gums. (b) Patient’s facial appearance. (c) Bleeding under the patient's nails. (d). Bleeding under the patient's nails.

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Table 1. Laboratory examination results

Variable	Measured Result	Units	Normal range
WBC	9.78	10^3/µL	4.1-11.0
Hemoglobin	6.8	g/dL	13.5-17.5
MCV	88.00	fL	80.0-100.0
MCH	26.40	pg	26.0-34.0
PLT	257.00	10^3/µL	150-440
AST/SGOT	31.7	U/L	5-34
ALT/SGPT	25.00	U/L	11.00-50.00
BUN	23.00	mg/dL	8.00-23.00
Creatinin	0.79	mg/dL	0.72-1.25
e-LFG	126.57		>= 90
PPT	26.9	Detik	10.8-14.4
APTT	40.5	detik	24-36
INR	1.95	detik	0.9-1.1
Complete Urine Test			
Urine protein	+1	mg/dL	Negative
Urine keton	+1	mmol/L	Negative
Nitrite	Negative	mg/dL	Negative
Leukocyte sediment	1.9	/LPB	2
Complete Stool Test			
Consistency	Soft		Soft
Blood	Positive		Negative
Color	Yellow		Yellow-brown
Amoeba	Negative		Negative
Worm eggs	Negative		Negative

A complete blood laboratory examination found abnormalities, namely a decrease in hemoglobin levels to 6.8 g / dL (13.5-17.5) with a normocytic normochromic profile. Liver and kidney function tests were within normal limits. Hemostasis function examination found an increase in PPT, APTT, and INR, namely 26.9 (10.8-14.4), 40.5 (24-36), and 1.95 (0.9-1.1), respectively. Urinalysis examination found protein +1 and ketone +1. A complete stool examination revealed positive blood. The patient underwent a peripheral blood smear examination with the impression of normochromic normocytic anemia. A chest X-ray examination found suspicion of pneumonia. The patient had a colonoscopy examination with the results of proctitis and ileocecal junction inflammation and PA results with non-specific proctitis results.

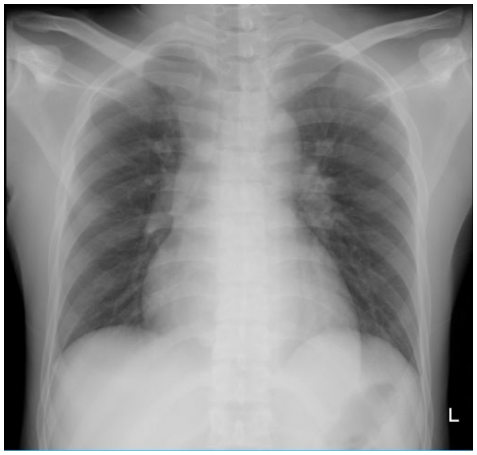

Fig. 2. Chest X-Ray photo of the patient.

The patient was diagnosed with the suspect scurvy disease, moderate normocytic normocytic anemia ec suspect anemia on chronic disease + acute bleeding, hematochezia ec suspect mucosal laceration dd internal hemorrhoid, community pneumonia

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PSI Class IV ec suspect bacterial dd/ pulmonary tuberculosis, Neurodermatitis, prurigo nodularis, suspect tinea corporis. The patient was planned to have serum vitamin C levels checked, but this could not be done due to the unavailability of the supporting reagents.

The patient was treated with O2 nasal cannula 2 pm, IVFD Nacl 0.9% 20 tpm, soft diet 2100 kcal/day, PRC transfusion 1-2 kolf/day target Hb ≥ 10 gr/dl, Levofloxacin 750 mg every 24 hours (iv), Cefoperazone 1 g every 12 hours (iv), Vit c 1000 mg every 24 hours (iv), N-acetylcysteine 200 mg every 8 hours (po), paracetamol 500 mg every 8 hours (po). The patient was also given Desoxymethasone 0.25% every 12 hours topical and Chloramphenicol 2% every 12 hours topical by department of dermatologist. With clinical treatment, the patient improved and was discharged on the 11th day and given vitamin C 100 mg every 24 hours and education for a diet containing vegetables and fruits for outpatient treatment.

Fig. 3. Patient condition after 1 year of therapy.

DISCUSSION

Vitamin C deficiency, also known as scurvy, is a disease associated with socioeconomic status and access to food. Scurvy is one of the oldest diseases known to man. The first recorded instance of scurvy dates back to the 13th century when evidence of scurvy was found in dry countries in Eastern Europe and South Asia, where green vegetables were scarce [4].

Scurvy is also known as a disease that often affects sailors. The first recorded outbreak of scurvy in sailors was during the Portuguese expedition to India in 1497, led by Vasco da Gama. The expedition lasted four months, and out of 148 crew members, 93 died from scurvy. In the 1700s, James Lind of the Royal Navy determined that consumption of lemons and oranges caused remission of the disease, and in 1927, it was discovered that scurvy was caused by vitamin C deficiency [5].

Scurvy is a clinical syndrome resulting from vitamin C deficiency. Vitamin C is naturally found in fresh fruits and vegetables such as oranges, lemons, limes, potatoes, spinach, broccoli, red peppers, and tomatoes. Up to 90% of vitamin C is consumed in the form of vegetables and fruits. Insufficient intake of these foods has become the most common cause of deficiency. The total body stores of vitamin C are 1500 mg, and the clinical picture of scurvy occurs when the body's vitamin C levels are below 350 mg. The body's stores of vitamin C are usually depleted within 4 to 12 weeks of stopping vitamin C intake. Risk factors for the development of scurvy include alcoholism, a diet poor in fruits and vegetables, smoking, eating disorders, type I diabetes, inflammatory bowel disease, iron overload, and restrictive diets due to food allergies [5,6].

Vitamin C is an essential vitamin for humans. Vitamin C (ascorbic acid) plays a role in the formation of type IV collagen. Type IV collagen is a principal constituent of blood vessel walls, skin, and the basement membrane zone separating the epidermis from the dermis. Vitamin C allows hydroxylation and cross-linking of pro-collagen catalyzed by lysyl hydroxylase. Vitamin C deficiency decreases pro-collagen transcription. In addition, ascorbic acid deficiency causes epigenetic DNA hypermethylation. It inhibits the transcription of various types of collagen found in the skin, blood vessels, and tissues, which can cause manifestations in the form of bleeding that can occur in almost all organs. In addition, there is a disturbance in bone formation, and bone fragility occurs [4,7].

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Vitamin C deficiency manifests after 8 to 12 weeks of inadequate intake and presents initially with irritability and anorexia. Following these initial symptoms, dermatologic findings include poor wound healing, gingival swelling with tooth loss, mucocutaneous petechiae, ecchymoses, and hyperkeratosis. Corkscrew and swan-neck hairs are present due to impaired disulfide bond formation. Perifollicular hemorrhages are often localized to the lower extremities, as capillary fragility cannot withstand gravity-dependent hydrostatic pressure. Beyond the mucocutaneous manifestations, several other organ systems are involved. Rheumatologic problems such as painful hemarthrosis and subperiosteal hemorrhages may occur due to vascular fragility due to impaired collagen formation. Bone pathology also appears, and fractures in brittle bones are present due to impaired endochondral bone formation. Ocular manifestations of hemorrhage include retrobulbar hemorrhage into the optic nerve, resulting in atrophy and papilledema. Gastrointestinal bleeding may also occur. The final stage of the disease can be life-threatening due to complications such as hemolysis and seizures [8,9].

In patients, it was found that it was consistent with scurvy in the form of complaints of weakness for one month ago and worsening for one week before admission to the hospital. Weakness increases during activity and decreases when resting. In addition, it was also found that the patient experienced manifestations of bleeding in his body in the form of bleeding gums and bleeding from the digestive tract. The patient's nails also showed manifestations of bleeding in the form of purplish spots under the patient's nails, which are commonly known as periungual hemorrhage. The risk factors in this patient are also in accordance with the theory, namely a crew background with consumption of rice and fish, without ever consuming fruits or vegetables at all. The patient has also been a crew background for 8 months, which is in accordance with the theory that the body's vitamin C reserves will no longer be able to meet the need for vitamin C after not consuming vitamin C from outside for> 12 weeks.

The diagnosis of scurvy can be made using the WHO guidelines published in 1999. Until now, there have been no new criteria from WHO for the diagnosis of scurvy. Based on WHO guidelines in 1999, 3 things must be met to diagnose scurvy, namely a history of inadequate vitamin C diet, the presence of clinical manifestations characteristic of scurvy (**Table 1**), and biochemical indices, namely low levels of vitamin C in the blood (serum, white blood cells, and whole blood) and low urinary excretion levels. Vitamin C levels in the blood are said to be low in adults, with a cutoff point of <0.3/100 ml [10].

Table 2. Clinical manifestations of scurvy in adults (10)

Organs that are Affected	Disturbances that Occur
Skin	Diffuse petechial hemorrhages
	Hyperkeratotic papules on the calves and buttocks
Mouth	Bleeding gums
	Red spots on the gums
Blood	Moderate to severe anemia
Bone	Irregular masses of calcified cartilage in fibrous tissue
	Decreased bone density

Based on WHO diagnostic criteria, the patient was found to have a history of inadequate vitamin C diet because of his work as a crew background who only consumed rice and fish without fruits and vegetables for the past 8 months. In the clinical manifestation parameters, there was weakness, shortness of breath, swollen and bleeding gums, diarrhea sometimes accompanied by blood, pain in both legs, cramps, difficulty moving and sometimes swelling and on physical examination, found anemic conjunctiva, icteric sclera, lower extremities edema, hyperpigmentation plaque lesions, xerosis and blackness at the tips of the fingernails. Supporting examination as a specific biochemical index in this case obtained laboratory results of hemoglobin 6.8 mg/dl. The patient has met the criteria for a history of poor vitamin C diet and the clinical manifestation domain of the WHO diagnostic criteria.

The subsequent examination that should be done on the patient, according to the theory, is the examination of serum vitamin C levels. However, due to the limited supporting tools for the examination, the levels of vitamin C (ascorbic acid) in the

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blood cannot be done. However, according to WHO itself, low plasma ascorbic acid levels do not always indicate scurvy, but scurvy that has manifested clinically always has low or no ascorbic acid levels. However, ascorbic acid levels in the body that continue to be low, less than 0.1 mg/100 ml, may eventually cause scurvy. Therefore, the patient can be suspected of having scurvy [10].

The mainstay of treatment for scurvy is treating the underlying condition that is causing the disease. Consuming foods high in vitamin C is one way to prevent scurvy. The daily requirement for vitamin C is 45 mg per day for children, 90 mg per day for men, 75 mg per day for women, and up to 120 mg per day for lactating women. Eliminating other risk factors, such as smoking and alcohol use, can also help in the treatment of scurvy. In patients with scurvy and clinical manifestations, direct vitamin C replacement is needed. Direct vitamin C replacement is given at a dose of 300 mg daily for children and 500 mg to 1000 mg daily for adults. Treatment is stopped after one month of giving the above dose of vitamin C or after the resolution of clinical symptoms. An alternative treatment regimen for adults is 1-2 grams of vitamin C for up to 3 days, followed by 500 mg daily for a week, followed by 100 mg daily for up to 3 months Click or tap here to enter text.[11.12].

The patient himself has been given vitamin C replacement therapy in accordance with the theory, namely with a dose of 1000 mg intravenously every day. The patient received this therapy while in the hospital, along with other supporting therapies such as PRC transfusion, antibiotics, and other medicines from skin TS. Improvement was found in complaints of weakness, pain, and confusion in the patient after 1 day of vitamin C administration. Other complaints were found to improve gradually during treatment. The patient was able to undergo outpatient care on the 11th day of treatment. The patient was then discharged with the administration of 100 mg of vitamin C every 24 hours for outpatient treatment. The patient was also given education so that they could consume fruits and vegetables so that clinical manifestations like this would not occur again in the future.

In general, vitamin C supplementation is safe, but high doses can cause side effects, especially in susceptible individuals. One possible side effect is the formation of oxalate kidney stones [13]. In some cases of individuals receiving high doses of vitamin C supplementation, deficiency symptoms can recur after stopping therapy. This indicates differences in vitamin C homeostasis in each individual. Therefore, it is essential to monitor patients closely during and after stopping therapy to prevent relapse [14]. In addition, long-term dietary adjustments are necessary to avoid the relapse of scurvy [15]. This can be done with a diet rich in natural sources of vitamin C, such as fresh fruits and vegetables. In some cases, ongoing vitamin C supplementation may be needed to ensure adequate levels of vitamin C in the body [16].

CONCLUSION

Scurvy can still be found in populations with limited access to fruits and vegetables, such as sailors who sail for long periods without adequate vitamin C intake. The diagnosis itself is established by a history of decreased consumption of foods containing vitamin C, clinical manifestations that suggest scurvy and laboratory evidence of low vitamin C levels. Administration of high doses of vitamin C and significant clinical improvement after therapy are effective in overcoming the symptoms of scurvy patients. Further research on the effectiveness of various doses of vitamin C supplementation and long-term monitoring to prevent recurrence are needed.

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