

# Scurvy: an Often Misdiagnosed Condition in the Modern Days?

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## Abstract

Scurvy is a rare disease in developed countries and few cases have been reported in adults within the last years. We aimed to report and discuss a case of a 35-year-old male with a medical history of irritable bowel syndrome (IBS) who initially presented to the emergency department with complaints of right leg pain, swelling, and weakness. Physical exam revealed low degree fever associated with right knee and ankle ecchymosis and edema, in addition to a well healing laceration on the anterior tibia with hyperpigmentation. Laboratory results showed elevated inflammatory markers. Due to the high suspicion of bone or soft tissue infection, antibiotic treatment was started without improvement. Upon reassessment and closer inspection of the skin, the patient was noted to have follicular hyperkeratosis and perifollicular hemorrhage; that in combination with a restrictive diet due to IBS, raised the suspicion of scurvy. Vitamin C levels were  $<5 \mu\text{mol/L}$  confirming the diagnosis. The patient received intravenous vitamin C showing significant improvement and was discharged home a few days after with oral vitamin C supplementation. In conclusion, scurvy should still be suspected as a diagnostic possibility in the modern days, especially in patients with restrictive dietary patterns. Prompt management of this entity leads to favourable outcomes and prevents further complications.

## Keywords

cellulitis, irritable bowel syndrome, osteomyelitis, scurvy, vitamin C

## INTRODUCTION

Vitamin C is a water-soluble vitamin essential for bone and blood vessel health and wound healing. This compound plays an important role in the synthesis of collagen, carnitine, hormones, and amino acids.<sup>[1]</sup> Scurvy is a clinical condition resulting from inadequate intake of vitamin C. It was first identified in the eighteenth century and since then the incidence has been sporadic, primarily in times of famine and war.<sup>[2]</sup> Scurvy is a rare disease in developed coun-

tries and few cases have been reported in adults within the last couple years.<sup>[3-7]</sup> This entity frequently goes undetected for extended periods of time and may prove to be fatal.<sup>[2-7]</sup> Suspicion for this disease is raised predominantly by the physical examination findings and less through laboratory and radiological testing. In the present study, we aimed to report and discuss a case of a patient with an initial presumptive diagnosis of osteomyelitis and soft tissue infection of the leg that was later diagnosed as scurvy provoked by a restrictive diet.

## CASE REPORT

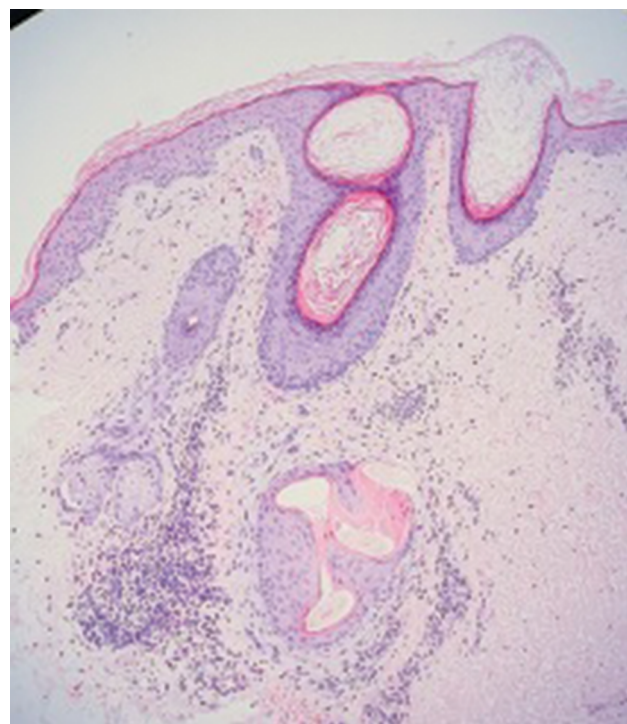
A 35-year-old male presented to the emergency department with complaints of right leg pain, swelling, and weakness. The symptoms were preceded by an injury he had two weeks before. He reported slipping and scraping his right lower leg around the site of pain and swelling. Additionally, the patient noted worsening progressive dyspnea and light-headedness that started by the time of the injury. Medical history was pertinent for irritable bowel syndrome (IBS) constipation type. The patient reported that he was following a homemade diet mostly restricting foods with highly fermentable oligo-, di-, monosaccharides, and polyols (FODMAPs) as well as other symptom triggering foods due to IBS. Social history was negative for alcohol use, tobacco use or illicit drug use. Family history was notable for diabetes mellitus, ulcerative colitis, and hemophilia. The patient reported no recent travel history.

On physical examination, low grade fever (100.3°F, 38°C) was found and the rest of vital signs were normal. Right knee ecchymosis with limited range of motion secondary to edema was noted. Right ankle edema was also observed, in addition to a well healing laceration on the anterior tibia with hyperpigmentation on the edges (Fig. 1). Laboratory workup was notable for anemia (hemoglobin 8.9 g/dL, hematocrit 26%), leukocytosis (white blood count 14.7 thousand/mcL; neutrophil 13.20 thousand/mcL), thrombocytosis (platelets 543 thousand/mcL), low iron (iron 25 mcg/dL) and markedly low folate levels (folate <2.00 ng/mL). In light of patient's complaint of dyspnea, D-dimer was ordered and was found

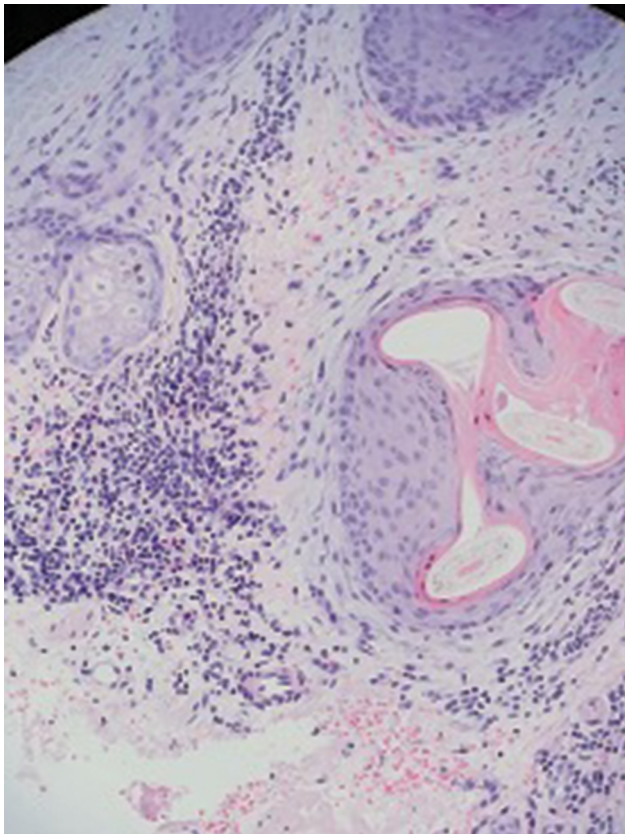
to be elevated; as a result, he underwent a computerized tomography (CT) angiogram of the chest which was negative for pulmonary embolus, pneumonia, or pulmonary edema. Additional workup also revealed elevated inflammatory markers (erythrocyte sedimentation rate: 38 mm/hour, C-reactive protein: 53.30 mg/L). In consideration of the laboratory results and the fever, a diagnosis of osteomyelitis was strongly suspected. A magnetic resonance imaging (MRI) of the right lower extremity was ordered and revealed generalized subcutaneous edema throughout the calf with a small amount of fluid tracing down the deep to the medial head gastrocnemius; ill-defined muscle edema was also noted in the anterior, lateral, and posterior compartments. Imaging results ruled out osteomyelitis; however, infectious myositis/cellulitis was suspected. In that sense, empiric antibiotic treatment for a soft tissue infection of the right lower extremity was started with oral doxycycline 200 mg per day. Over the next three days, the pain and swelling were more severe and no significant improvement was observed. Upon closer inspection of the skin, the patient was noted to have follicular hyperkeratosis and perifollicular hemorrhage; that in combination with his significantly restrictive diet due to IBS, raised the suspicion for vitamin C deficiency. An indepth investigation was conducted in regards to patient's symptoms and dietary patterns, at which point he reported intermittent gum bleeding as well. Punch biopsy of the wound was performed to obtain clarity, results of which revealed dilated hair follicle containing a "corkscrew" hair with perifollicular hemorrhage and perifollicular and perivascular lymphocytic inflammation (Figs 2, 3). As a result, vitamin C level was tested which was <5 µmol/L thereby confirming the diagnosis of scurvy.



**Figure 1.** Well healing laceration on the anterior tibia with hyperpigmentation on the edges of the right lower extremity.



**Figure 2.** Dilated hair follicle containing a 'corkscrew' hair with perifollicular hemorrhage and perivascular lymphocytic inflammation.



**Figure 3.** Magnified view of the dilated hair follicle with surrounding perifollicular and perivascular lymphocytic inflammation.

*Vitamin C deficiency in this patient was attributed to his severely restricted diet in light of his IBS diagnosis. Even during the hospitalization, the patient opted to consume meals prepared and brought by his family. After the diagnosis was made, the patient was treated with intravenous vitamin C 1 g per day with significant improvement and was discharged home 4 days after in a stable condition under supplementation with oral vitamin C 1 g per day. Physical therapy was scheduled for rehabilitation due to residual articular pain.*

## DISCUSSION

The features of scurvy in this young individual included anemia without hemolysis, gingival bleeding, poor wound healing, and perifollicular hemorrhage with corkscrew hair. The clinical suspicion for the disease was raised primarily with the dermatological findings and lack of better diagnosis despite extensive evaluation. Scurvy is predominant in younger children in developing countries; however, in adults it is commonly seen in alcoholics, individuals with psychiatric disorders, malnourished, and those in social isolation.<sup>[2]</sup> The patient's strict adherence to a restrictive diet in light of his history of irritable bowel syndrome made the patient susceptible to a nutritional deficiency, in this case vitamin C deficiency.

Vitamin C is known to play an essential role in bone and

blood vessel growth and wound healing. In addition, it has been found to have significant antioxidant and anti-inflammatory properties, and as result is being studied in the cancer and cardiovascular disease population.<sup>[8]</sup> The timeline for onset of symptoms of scurvy can vary and signs can develop as early as one month of poor or no vitamin C intake.<sup>[8]</sup> The clinical manifestations of scurvy include arthralgia, hemarthrosis, compartment syndrome from intramuscular hematomas, and gingival hypertrophy, and bleeding.<sup>[2]</sup>

Musculoskeletal manifestations are present in about 80% of the patients. In our patient, MRI findings of the right lower extremity were suspicious for myositis. Similar imaging findings were also noted in two other case reports, one of a 54-year-old woman and another in a 10-year-old boy.<sup>[9,10]</sup> As was the case in our patient, patients received antibiotics to treat for suspected osteomyelitis; until a punch biopsy confirmed the diagnosis of scurvy. This supports the notion that scurvy could masquerade as an infectious cellulitis and an indepth dermatological and hematologic evaluation should be conducted in high risk groups to evaluate for vitamin C deficiency.

Laboratory findings in scurvy include anemia, which could be microcytic, normocytic or macrocytic.<sup>[2]</sup> As was in our patient's case, though he had evidence of microcytic anemia, he was also found to have a combined iron and folate deficiency, both attributed to restrictive diet. Hypoalbuminemia is also common, in part due to malnutrition.

Scurvy is easy to prevent by consuming a balanced diet rich in fresh fruits and vegetables. Daily requirements of vitamin C are up to 45 mg/day in children, 90 mg/day in men, 75 mg/day in women and up to 120 mg/day in lactating women.<sup>[2]</sup> Treatment of scurvy is aimed at 500-1000 mg/day supplementation of vitamin C in adults, for up to one month or until symptom resolution.<sup>[2]</sup> Marked improvement can be observed as early as one day following instauration of treatment.<sup>[9]</sup> On the other hand, vitamin C is generally well tolerated and considered to be safe but doses higher than 1 g may increase the risk of nephrolithiasis.<sup>[11]</sup> Besides nutritional replacement of vitamin C, the key treatment is identification and management of the underlying problem causing scurvy.

In conclusion, scurvy is a rare condition that should still be suspected as a diagnostic possibility in the modern days, especially in patients with restrictive dietary patterns. The presented case illustrates the importance of obtaining an indepth clinical history when laboratory tests are not conclusive or sometimes misleading. Prompt management of this entity leads to favourable outcomes and prevents further complications.

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## Competing interests

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## REFERENCES

1. Maxfield L, Crane JS. Vitamin C deficiency. In: StatPearls. Treasure Island (FL): StatPearls Publishing; July 2, 2020.
2. Fain O. Musculoskeletal manifestations of scurvy. Joint Bone Spine 2005; 72(2):124–8.
3. Doll S, Ricou B. Severe vitamin C deficiency in a critically ill adult: a case report. Eur J Clin Nutr 2013; 67(8):881–2.
4. Uruña-Palacio S, Ferreyro BL, Fernández-Otero LG, et al. Adult scurvy associated with psychiatric disorders and breast-feeding. BMJ Case Rep 2018; 2018:bcr2017223686.
5. Francescone MA, Levitt J. Scurvy masquerading as leukocytoclastic vasculitis: a case report and review of the literature. Cutis 2005; 76(4):261–6.
6. Wang AH, Still C. Old world meets modern: a case report of scurvy. Nutr Clin Pract 2007; 22(4):445–8.
7. Léger D. Scurvy: re-emergence of nutritional deficiencies. Can Fam Physician 2008; 54(10):1403–6.
8. Ods.od.nih.gov. 2020. Office of Dietary Supplements – Vitamin C. [online] Available from: <https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/> [Accessed 20 December 2020].
9. Kinlin LM, Blanchard AC, Silver S, et al. Scurvy as a mimicker of osteomyelitis in a child with autism spectrum disorder. Int J Infect Dis 2018; 69:99–102.
10. Smith A, Di Primio G, Humphrey-Murto S. Scurvy in the developed world. CMAJ 2011; 183(11):E752–5.
11. Doseděl M, Jirkovský E, Macáková K, et al. Vitamin C – sources, physiological role, kinetics, deficiency, use, toxicity, and determination. Nutrients 2021; 13(2):615.

## Цинга: часто неправильно диагностируемое заболевание в наши дни?

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## Резюме

Цинга является редким заболеванием в развитых странах, и в последние годы было зарегистрировано несколько случаев заболевания у взрослых. Мы стремились сообщить и обсудить случай 35-летнего мужчины с историей болезни синдрома раздражённого кишечника (СРК), который первоначально обратился в отделение неотложной помощи с жалобами на боль в правой ноге, отёк и слабость. Физикальное обследование выявило небольшую лихорадку в сочетании с экхимозом и отёком правого колена и лодыжки, а также хорошо заживающую рваную рану на передней поверхности большеберцовой кости с гиперпигментацией. Лабораторные результаты показали повышенные маркеры воспаления. Из-за высокого подозрения на инфекцию костей или мягких тканей лечение антибиотиками было начато без улучшения. При повторном осмотре и тщательном осмотре кожи у больной отмечены фолликулярный гиперкератоз и перифолликулярные кровоизлияния; что в сочетании с ограничительной диетой из-за СРК вызвало подозрение на цингу. Уровни витамина С были  $<5 \mu\text{mol/L}$ , подтверждающие диагноз. Пациент получил внутривенное введение витамина С, продемонстрировав значительное улучшение, и через несколько дней был выписан домой с пероральным приёмом витамина С. В заключение, в наши дни всё ещё следует подозревать цингу как диагностическую возможность, особенно у пациентов с ограничительным режимом питания. Своевременное лечение этого образования приводит к благоприятным исходам и предотвращает дальнейшие осложнения.

## Ключевые слова

целлюлит, синдром раздраженного кишечника, остеомиелит, цинга, витамин С