




Scurvy in autism spectrum disorder-associated food selectivity: a case report

Escorbuto associado à seletividade alimentar no transtorno do espectro autista: relato de caso

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ABSTRACT

Introduction: Alert healthcare professionals about the possibility of scurvy in autistic patients with extreme food selectivity. **Case Description:** A 3-year-old male child was admitted to hospital due to two-month-long claudication, constipation and lower-limb pain complains, and a history of oral injury. After medical evaluation, no significant changes were found in complementary exams and imaging. The hospital dentistry team examined him and found a granulomatous lesion in both upper alveolar ridge and gingiva as well as other small granulomas scattered bilaterally in the posterior maxillary gingiva. An incisional biopsy showed the morphological appearance of a non-specific inflammatory process with the formation of exuberant granulation tissue. Hypovitaminosis C was hypothesized because of the gingival condition, petechiae in the lower limbs, and dietary restrictions. This hypothesis was confirmed through laboratory tests. Vitamin C was administered orally at a dose of 300mg once a day. Upon gradual improvement of his limb movements and oral lesions. **Discussion:** Scurvy is caused by a severe deficiency of vitamin C, or ascorbic acid, in the body. This vitamin plays an important role in regulating intracellular redox potential. It is essential for collagen synthesis, which facilitates the enzymatic hydroxylation of proline into hydroxyproline. Failure in collagen synthesis impairs wound healing and causes poor fibroblast and osteoblast functions. Vitamin C deficiency increases susceptibility to periodontal diseases. **Conclusion:** The food selectivity commonly present in autism spectrum disorder is characterized by monotonous diets that often lack foods containing vitamin C, increasing the risk of scurvy and its consequences.

Keywords: Scurvy; Food selectivity; Autism spectrum disorder; Periodontal disease.

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RESUMO

Introdução: Alertar os profissionais de saúde sobre a possibilidade de escorbuto em pacientes autistas com seletividade alimentar extrema.

Relato do Caso: criança de 3 anos, do sexo masculino, internado em hospital devido à queixa de claudicação, constipação e dor em membros inferiores há dois meses e histórico de lesão oral. Após avaliação médica, não foram encontradas alterações significativas em exames complementares e de imagem. Foi avaliado pela odontologia hospitalar que observou lesão granulomatosa em gengiva e rebordo alveolar superior, além de pequenos granulomas em gengiva inserida posterior de maxila bilateralmente. Realizada biópsia incisional que demonstrou aspecto morfológico de processo inflamatório inespecífico com formação de tecido de granulação exuberante. Devido a quadro gengival, petéquias em membros inferiores e restrição alimentar, foi aventada a hipótese de hipovitaminose C (escorbuto), confirmado em exame laboratorial. Iniciado vitamina C via oral na dose de 300mg uma vez ao dia e paciente evoluiu com melhora progressiva da movimentação dos membros inferiores e das lesões orais. **Discussão:** O escorbuto é causado por deficiência grave de vitamina C, ou ácido ascórbico, no organismo. Essa vitamina participa da regulação do potencial de oxirredução intracelular. É essencial para a síntese de colágeno, o que facilita a hidroxilação enzimática de prolina para hidroxiprolina. A falha dessa etapa na síntese de colágeno causa prejuízo na cicatrização de feridas, função deficiente de fibroblastos e osteoblastos. Na cavidade oral, a deficiência de vitamina C aumenta a suscetibilidade às doenças periodontais. **Conclusão:** A seletividade alimentar comumente presente no transtorno do espectro autista é caracterizada por dietas monótonas e frequentemente não incluem alimentos com fonte de vitamina C, aumentando o risco de escorbuto e suas consequências.

Palavras-chave: Escorbuto; Seletividade alimentar; Transtorno do espectro autista; Doença periodontal.

INTRODUCTION

Scurvy is caused by a severe deficiency of vitamin C, or ascorbic acid. This vitamin plays an important role in regulating intracellular redox potential.¹ It is essential for collagen synthesis. Failure in collagen synthesis impairs wound healing and causes poor fibroblast and osteoblast functions¹⁻³. While it usually plays an antioxidant role, it can also be a pro-oxidant in low concentrations². In the early stages, vitamin C deficiency causes malaise, fatigue, and lethargy. Upon 1-3 months of low intake, it can lead to anemia, myalgia, bone pain, hematomata, petechiae, and mood changes³. In the oral cavity, vitamin C deficiency increases the gingival barrier permeability and therefore the individual's susceptibility to periodontal diseases¹.

Scurvy is very rare nowadays but found in both hemispheres of the planet¹. It manifests itself under special

circumstances in all age groups. It usually does not affect the pediatric age group, but it should be considered in the diagnosis of children with severe dietary restrictions⁴. Often, in this pediatric population with food selectivity, the diagnosis is confused and consequently delayed, as other morbidities such as malignancies, coagulopathies, septic arthritis, osteomyelitis, or rheumatological disorders are frequently initially considered⁵⁻⁸. This case report aims to draw attention to the diagnosis of hypovitaminosis C in children with musculoskeletal, skin and oral cavity manifestations and autism spectrum disorder-associated food selectivity.

CASE REPORT

A 3-year-old male preschooler with level-2 autism spectrum disorder from a city in the state of Minas Gerais, Brazil,

was admitted to hospital. He experienced limb pains and progressive gait disorders, including 2-month-long claudication and nearly-1-month-long inability to remain standing. He was administered dipyrrone, naproxen and, finally, oral corticosteroids, to now avail. He reportedly manifested food refusal, weight loss, and irritability. He had a mouth trauma because of a fall from his standing level the week before and his right deciduous maxillary central incisor was extracted, with a rapidly growing lesion ensuing at the site.

On physical examination, he experienced pain on lower limb extension and rotation but no joint edema. He was examined by an orthopedist, who observed no osteoarticular compromise and requested a pelvic X-ray which returned all clear. He was also examined by a pediatric neurologist who raised the hypothesis of polyradiculopathy, which was ruled out after a spine MRI showed no changes and normal cerebrospinal fluid.

The hospital dentistry team examined the child and found a granulomatous lesion in both upper alveolar ridge and gingiva (Figure 1) as well as other small granulomas scattered bilaterally in the posterior maxillary gingiva (Figure 2). Due to the characteristics and diffuse involvement of the oral lesions, a gingival biopsy was performed, and the pediatric oncologist was requested to evaluate a potential leukemic infiltration. An incisional biopsy showed the morphological appearance of a non-specific inflammatory process with the formation of exuberant granulation tissue.

Laboratory evaluation showed only anemia (Table 1). The bone marrow examination showed 26% blasts of myeloid lineage but with an immunophenotyping not suggestive of neoplastic infiltration, ruling out leukemia. A possible bone marrow reaction was considered.

Hypovitaminosis C (scurbutus, or scurvy) was hypothesized because of the gingival condition, petechiae in the lower limbs, and dietary restrictions. The nutritional assessment pointed hypovitaminosis D (17.7ng/ml), and very low levels of vitamin C (0.15mg/dL), confirming the diagnosis of scurvy (Table 1). Vitamin C was administered orally at a dose of 300mg once a day. Upon gradual improvement of his limb movements and oral lesions, the child was discharged from hospital.

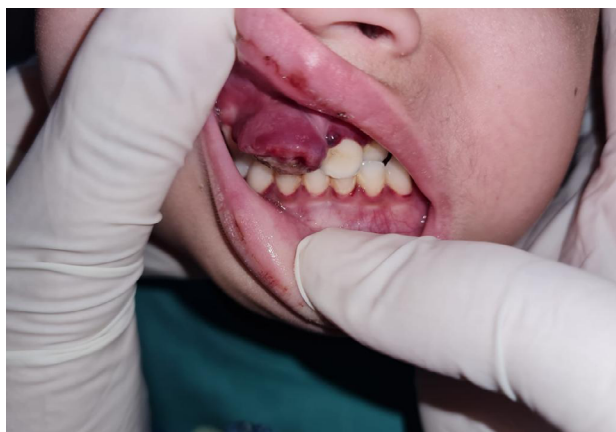


Figure 1. Granulomatous lesion in both upper alveolar ridge and gingiva



Figure 2. Small granulomas scattered bilaterally in the posterior maxillary gingiva.

Table 1. Laboratory test results table.

Exam	Result	Reference
Vitamin C	0.15 mg/dl	0.5 to 1.5 mg/dl
Vitamin B12	500.4 pg/ml	201 to 804 pg/ml
Vitamin D	17.7 ng/ml	30 to 60 ng/ml
Vitamin A	0.18 mg/l	0.30 to 0.70 mg/l
Ferritin	128.5 ng/ml	10 to 140 ng/ml
Albumin	4.01 g/dl	3.8 to 5.4 g/dl
Antinuclear Factor	Non reactive	Non reactive
Rheumatoid Factor	<10 UI/ml	<20 UI/ml
Hemoglobin	7.7 g/dl	11 to 14.5 g/dl
Platelets	278.000/mm ³	135.000 to 450.000/mm ³
Lactic Dehydrogenase	279.6 U/l	120 to 300 U/l
Alkaline Phosphatase	112.4 U/l	< 390 U/l
Total Billirubin	0.12 mg/dl	< 1.4 mg/dl
Total Proteins	6.4 g/dl	6 to 8 g/dL
Gamma Glutamyl Transferase	12.56 U/l	10 to 71 U/l
Pyruvic Glutamic Transaminase	2.4 U/l	< 49 U/l
Glutamic Oxalacetic Transaminase	16 U/l	< 40 U/l

DISCUSSION

Ascorbic acid plays a crucial role in collagen hydroxylation. Some tissues such as skin, gingivae, mucous membranes, and bones contain a higher concentration of collagen and

are therefore more susceptible to deficiency of this vitamin⁹. Musculoskeletal manifestations may ensue in 80% of scurvy cases and stand out in the pediatric age group. In the present case, what motivated the search for medical care was limb pain, which limited the child's movement and ability to remain standing. Systemic symptoms such as fatigue and loss of weight and appetite have been also reported; in the present case, the child had his weight and height curve and general condition affected⁹. Oral symptoms may include gingiva disorder, encompassing swelling, bruising, bleeding gingivae, and loose teeth^{1,4,9}. The child's gingival lesions drew attention and motivated the investigation of non-rheumatological and/or oncohematological causes.

Cases of scurvy can be difficult to diagnose. In other case reports, various diagnostic hypotheses such as polyradiculopathies, growing pains, oncohematological and rheumatological diseases were raised before reaching a diagnosis of scurvy^{10,11}.

A narrative review of scurvy cases in the pediatric age group found 116 cases described between 2000 and 2021. The research revealed a prevalence in males with neurological comorbidities. The most frequent manifestations were musculoskeletal complaints; 43% presented with gingival bleeding and 27% with gingival hypertrophy. It was noted that 18% of the patients underwent invasive procedures, and 52% had a diagnostic hypothesis of oncological diseases, data that corroborate with the patient in this report¹².

Vitamin C is found in citrus fruits (orange, kiwi, strawberry, tangerine) and vegetables (broccoli, cabbage, potato, bell pepper, cauliflower, and spinach). In newborns and infants, the main source of vitamin C is breast milk. Vitamin C is water-soluble, and excess is excreted in urine. It is stored in the body in limited amounts and should be replenished through regular dietary intake¹³.

Risk factors for vitamin C deficiency include fad diets, monotonous diets and severe diets that involve major dietary restrictions and consequently lead to macro- and micronutrient deficiencies.³ Even though scurvy is uncommon amongst children, it still appears in case reports, especially in children with severe dietary restrictions, including those with autism spectrum disorder, cerebral palsy or even serious neurological disorders^{1,3,4}. In the present case, the child had autism spectrum disorder associated with severe selectivity, leading to a monotonous carbohydrate-based, low-fiber diet consisting of less than 10 types of food. The child did not eat fruits and vegetables, which are the main natural sources of vitamin C.

Treatment consists of vitamin supplementation, with symptoms alleviating in the first 24 hours, pain reducing in 2-4 days, and gingival lesions improving in 2-3 weeks. Complete recovery may occur after 3 months of adequate supplementation.⁴ The child in question started standing about 3 days after initial supplementation. Intravenous administration is much more effective in raising serum ascorbic acid levels.

In humans, the need for vitamin C is generally met by natural sources and supplementation of vitamin C in the usual diet. The only benefit of supplementing vitamin C is to prevent scurvy, which requires low doses of ≤ 10 mg per day³. In cases of treatment, higher doses are recommended. Children diagnosed with autism spectrum disorder often have sensory sensitivities that contribute to restrictive eating habits and difficulties adapting to new foods, textures, and flavors. Initially, it is valid to attempt the incorporation of foods containing vitamin C into the diet in collaboration with the family and a nutritionist. Alternatives can be used in various pharmaceutical forms of vitamin C: orally (chewable tablets, capsules, effervescent), intravenous, intramuscular, and rectal routes^{14,15}. In this case, 300mg per day was used due to the intensity of the symptoms, as recommended in the literature (100 to 300mg/day)^{4,7,16}.

CONCLUSION

Scurvy is rare in children, with musculoskeletal manifestations standing out in this age group. Early recognition of nutritional deficiencies, such as scurvy, can be difficult because symptoms are often vague and nonspecific and can mimic a variety of more common conditions. In children with eating disorders, scurvy is preventable through a vitamin C-rich diet and, if necessary, vitamin-C supplementation.

AUTHORS' CONTRIBUTION

We describe contributions to the papers using the taxonomy (CRediT) provided below:

Conceptualization, Investigation, Methodology, Visualization & Writing – review & editing: Authors Gabriella Mendes Dias Santos, Tatyana Borges Cunha Kock, Marília Ferreira Andrade, Frederico Chaves Salomão, Maria Eduarda Medeiros Macedo, Regina Maria Raffaele, Samira Ramiro da Costa Leles. *Project administration, Supervision & Writing – original draft:* Authors Gabriella Mendes Dias Santos, Tatyana Borges Cunha Kock, Marília Ferreira Andrade. *Validation & Software:* Author Gabriella Mendes Dias Santos. *Resources & Funding acquisition:* Author Marília Ferreira Andrade. *Data curation & Formal Analysis:* Authors Gabriella Mendes Dias Santos, Tatyana Borges Cunha Kock, Marília Ferreira Andrade.

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