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Pancytopenia due to Restrictive Food Intake in an Autistic Adult

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Abstract

Autism spectrum disorder (ASD) is a neuro-behavioral syndrome that develops in childhood and can be comorbid with restrictive and avoidant food intake disorder. This case details a young man who was hospitalized with pancytopenia due to restrictive nutritional intake related to his severe ASD. He was found to have undetectable vitamin B12 levels. His blood counts improved with transfusion, nutritional supplementation, and dental care. This report illustrates the importance of understanding ASD and potential medical complications of related behaviors.

Keywords

autism spectrum disorder, pancytopenia, avoidant/restrictive food intake disorder

Background

The rate of autism spectrum disorder (ASD) diagnosis has risen dramatically in the past 20 years. The 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*-5) was released by the American Psychiatric Association in 2013 to reflect updates in scientific and clinical understanding of the diseases within. New to the *DSM*-5, avoidant/restrictive food intake disorder (ARFID) expanded the previous diagnosis of feeding disorder of infancy and early childhood to include individuals in later stages of life. Neurodevelopmental disorders, including ASD, attention-deficit hyperactivity disorder (ADHD), and intellectual developmental disorder often are comorbid conditions due to the restrictive eating habits leading to medical interventions.[1] In addition, ASD may predispose individuals to ARFID if intake is restricted as a form of expression during distress.[2] As more neuroatypical patients receive care from complex medical systems, this case report highlights the importance of collaborative care of a patient with ARFID and ASD and the serious complications that can arise.

Case Report

A 26-year-old nonverbal Caucasian man with ASD level 3 and a history of restrictive oral intake presented to the emergency department with no oral intake for 5 days. The patient's diet consisted exclusively of potato chips, French-fries, popcorn, and sodas. He was previously supplemented with a multivitamin until the death of his primary caregiver 1 year prior. Of note, the patient's guardian also expressed concern that his teeth were affecting his oral intake. The patient only tolerated a minimal bedside oral examination which did not reveal any emergent pathology.

The patient was admitted for pancytopenia with white blood count (WBC) 2.51 (reference 4.8-10.8 L/cumm), hemoglobin 6.9 (reference 14-18 gm/dL), platelets 140 (reference 140-440 K/cumm), and a peripheral blood smear showing normocytic, normochromic anemia, and leukopenia with absolute neutropenia. The results of the complete blood count at the time of admission are shown in Table 1. Lactate dehydrogenase (LDH) was 1766 U/L (reference 100-240 U/L) and haptoglobin was undetectable <8 mg/dL (reference 14-258 mg/dL). Vitamin panel showed deficiencies in vitamins A, C, B6, B12, and folate with elevations in vitamin K. He received 3 units of packed red blood cells (RBCs), caloric supplementation with nutritional resource drinks, and vitamin replacement (Table 2). Ideally, he would have been managed with nasogastric feeding; however, collaborative discussion

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Table 1. Complete Blood Count at the Time of Admission.

	Reference range	Result
White blood cell count	4.8-10.8 (K/cumm)	2.51 (K/cumm)
Neutrophils (relative percent)	50%-74%	62%
Absolute neutrophil count	2.4-8.1 (K/cumm)	1.55 (K/cumm)
Lymphocytes (relative percent)	20%-45%	36%
Monocytes (relative percent)	0%-10%	1%
Hemoglobin	14-18 (g/dL)	6.9 (g/dL)
Mean corpuscular volume	80-94 (FL)	99.5 (FL)
Hematocrit	42%-52%	19%
Platelets	140-440 (K/cumm)	140 (K/cumm)

Table 2. Micronutrient Reference Ranges, Patient Levels on Presentation and Inpatient Replacement Treatment Used.

	Reference range	Result	Replacement
Vitamin A	0.3-1.2 (mg/L)	0.26 (mg/L)	50 000 IU By Mouth (PO) daily × 10 days
Vitamin B1	70-180 (nmol/L)	80 (nmol/L)	MVI × 3 days, 200 mg IV Q12H × 3 days
Vitamin B6	20-125 (nmol/L)	15.4 (nmol/L)	50 mg PO daily
Vitamin B12	211-911 (pg/mL)	<146 (pg/mL)	2000 mcg PO daily
Vitamin C	23-114 (umol/L)	10 (umol/L)	500 mg PO daily
1,25-Vitamin D	19.9-79.3 (pg/mL)	40.1 (pg/mL)	
Alpha-tocopherol	5.5-18 (mg/L)	7.6 (mg/L)	
Gamma-tocopherol	0-6 (mg/L)	0.6 (mg/L)	
Vitamin K	0.22-4.88 (nmol/L)	10.4 (nmol/L)	MVI × 3 days
Folate	7-31.4 (ng/mL)	1.8 (ng/mL)	MVI × 3 days, 4 mg PO daily
Iron	50-175 (mcg/dL)	235 (mcg/dL)	
Total iron binding capacity (TIBC)	245-425 (mcg/dL)	222 (mcg/dL)	
% iron saturation	25%-50%	25%	
Transferrin	174-382 (mg/dL)	177.6 (mg/dL)	
Ferritin	21.8-322 (ng/mL)	843.4 (ng/mL)	
Copper	70-140 (ug/dL)	107 (ug/dL)	
Zinc	60-120 (ug/dL)	65 (ug/dL)	
Ceruloplasmin	20-60 (mg/dL)	21 (mg/dL)	

Abbreviations: MVI = multivitamin infusion: Vitamin K 10 mL, folic acid 1 mg, thiamine 100 mg in dextrose 5% and NaCl 0.9% 1000 mL infusion.

with his father resulted in the decision to forgo this intervention as he was unlikely to tolerate given severity of ASD symptoms. During admission, potassium, magnesium, and phosphorus dropped, likely due to refeeding syndrome, and were replaced without cardiovascular complication. Serial examination showed uptrends in all cell lines.

The patient's weight improved, and he demonstrated compliance with limited diet and multivitamin. On discharge, caregivers were instructed to continue daily multivitamin supplementation, and coordination between the internal medicine team, developmental pediatrics, and dentistry arranged a special needs dental examination with subsequent readmission for tooth extraction by oral maxillofacial surgery.

Discussion

As the incidence of ASD grows, clinicians across many specialties will encounter a greater number of complications of this disorder or comorbid conditions. Severe nutritional deficiencies due to ARFID in this patient population should be recognized and aggressively managed with vitamin replacement. In a study of 288 ASD youth, over 40% had dietary deficiencies in choline, calcium, potassium, and vitamins B5, D, and E.[3] While Vitamin B12 deficiency is not the most common nutritional deficiency documented in ASD, it is shown to be deficient in many case reports with a variety of clinical symptoms.[4]

In this case, undetectable vitamin B12 was likely a significant contributor to his pancytopenia. Although megaloblastic anemia is the most common presentation, bone marrow suppression may occur, resulting in suppression of all cell lines.[5] It is noteworthy that the patient did not have concurrent iron deficiency which could cause normocytic anemia in the setting of B12 and iron deficiency. In addition, B12 deficiency can cause intramedullary hemolysis as demonstrated in this patient's increased LDH and decreased

haptoglobin. The relationship between vitamin B12 and ASD is complex. This case demonstrates the harmful effects of severe deficiency, but other studies have shown increased odds of developing autism in children born to mothers with extremely high serum B12 levels.[6] Furthermore, vitamin B12 supplementation has been shown in small studies to improve some clinical symptoms.[7] There is a great need for more study of the interplay between vitamin B12 and ASD.

Multiple micronutrient deficiencies in the context of pancytopenia required prompt replacement where specific guidelines for appropriate treatment are not readily available. Given the persistence of his restrictive diet and severity of ASD symptoms, making successful behavioral changes in the short term was highly unlikely, so the patient was discharged on long-term multivitamin supplementation to prevent vitamin-deficiency reoccurrence.

Few treatment options for ARFID have been evaluated through randomized control trials, particularly for adults. Psychosocial intervention involves cognitive-behavioral therapy and family-based treatment, while dietary management differs based on presentation and comorbid conditions. Typically, behavioral interventions include more frequent portions of preferred foods and/or food exposure therapy.[2] Strict criteria are not established regarding what degree of improvement in nutritional deficiency is required for resolution of ARFID.

Complex collaborative medical care was critical to the successful treatment of this case. The patient's developmental pediatrician made a rare house call regarding his decreased oral intake and arranged medical transportation to the hospital as the patient had known difficulty leaving his home. Internal medicine, inpatient pharmacy, and hematology worked together to develop a viable vitamin replacement strategy. Finally, inclusion of special needs dentistry and oral maxillofacial surgery during the initial hospitalization expedited dental evaluation and dental extractions on discharge, ultimately improving the patient's nutritional intake.

Conclusion

With the growing number of patients diagnosed with ASD, clinicians will be encountering patients with this disorder more and more which necessitates an understanding of the extent of restrictive behaviors in the disorder, potential comorbid or secondary conditions, and strategies to work with this patient populations and their caregivers. Laboratory monitoring and careful clinical examinations, sometimes under sedation, can be critical for caring for this patient population. Monitoring for restrictive nutritional intake and aggressively supplementing vitamins are important to prevent medical complications of these disorders.

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Informed Consent

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