Headband sign on magnetic resonance imaging: An unusual finding of scurvy in a 5-year-old child described first time

Umesh I. Patel, Jayendra R. Gohil, Alpa N. Parekh, Hardik R. Chauhan
Department of Pediatrics, Sir T Hospital, Bhavnagar, Gujarat, India

Address for correspondence: Dr. Umesh I. Patel, Department of Pediatrics, Sir T Hospital, Bhavnagar - 364 001, Gujarat, India.
E-mail: everumesh.patel@gmail.com

ABSTRACT

Scurvy usually presents with tender and painful limbs, swelling of joints, gum bleeding, poor wound healing, and muscle weakness. Here, we report a case of 5-year-old child with global developmental delay who presented with soft swelling of the head over scalp and protrusion of the left eye with extremely irritability. Neuroimaging was suggestive of diffuse extensive soft-tissue swelling involving the entire scalp with large necrotic collections with mild proptosis of the left orbit. It is not mentioned elsewhere, so we are giving name to this magnetic resonance imaging finding as “headband” sign or “turban” sign.

Key words: Headband sign, magnetic resonance imaging of the brain, scurvy

Introduction

Scurvy is caused by prolonged dietary deficiency of ascorbic acid (Vitamin C). It is a rare compared to other nutritional deficiency in children. High index of suspicion, detailed history, and physical examination is required in diagnosing disease. Children with mental illness or abnormal dietary habits are more prone to develop disease. Although uncommon, it still exists in high-risk groups including economically disadvantaged populations with poor nutrition.

Case Report

A 5-year-old female child coming from low socioeconomic class with global developmental delay was admitted to the pediatric department of Sir T Hospital with the history of increase head size and protrusion of the left eyeball for last 15 days. The child also had excessive irritability, especially when touched on any body part. There was no history of fever, trauma, bleeding from any site, vomiting, or altered sensorium. She was only on liquid and semisolid diet.

On examination, the child had severe acute malnutrition (weight for height below the third percentile). He was severely pale, afebrile and had no lymphadenopathy or hepatosplenomegaly. Posture of the child was frog-like. The child was extremely irritable. Tenderness was present all over the body mostly over the limbs. He had huge swelling over the entire head which had gradually increased in size. Swelling was soft in consistency with fluctuating baggy feel and tender. There was proptosis of the left eye with exposure keratitis.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

Cite this article as: Patel UI, Gohil JR, Parekh AN, Chauhan HR. Headband sign on magnetic resonance imaging: An unusual finding of scurvy in a 5-year-old child described first time. J Pediatr Neurosci 2016;11:355-7.
Vitals: T-N, heart rate-116/min, respiration rate-28/min, and blood pressure-86/68 mmHg.

Initially X rays of the skull bones was done, and there was no fracture in the skull. Ultrasonography of the scalp showed soft tissue outside the skull vault which was thickened (2.3 cm) with vascularity inside between the temporal and frontal regions. Neuroimaging was suggestive of diffuse extensive soft-tissue swelling involving the entire scalp with large necrotic collections and with mild proptosis of the left eye.

Diagnostic aspiration was suggestive of blood.

The laboratory results were as follows:

Hemoglobin: 5.2 g/dl; total count: 6800 cells/mm$^3$; and differential count: N 59%, L 37%, E 0, M 3%, and B 0%. Mean corpuscular volume: 90.5 fl, mean corpuscular hemoglobin: 30.4 pg, mean corpuscular hemoglobin concentration: 33.6%, and platelets: $3.2 \times 10^4$/mCL. Bleeding time 1.30 min (normal 2–8), clotting time 3.30 min (up to 11 normal), erythrocyte sedimentation rate: 15 mm/h, prothrombin time 13 s (normal), and activated partial thromboplastin time 27 s (normal). Electrolytes, liver, and renal function test were within normal limits.

The radiograph of the knee showed ground glass appearance of the shaft of the tibia, fibula, and femur. Irregular, thickened white line at the metaphysis and White line at the cortical ends were seen. All radiological features pointed toward scurvy [Figure 1].

Magnetic resonance imaging of the brain revealed diffuse extensive soft-tissue swelling involving entire scalp appearing hypointense on T1W in the left orbit extraconal compartment along the roof, with no obvious postcontrast enhancement or necrotic areas within and resultant mild proptosis of the left globe, less likely to be an abscess formation [Figure 2].

Ascorbic acid level was not done. The diagnosis of scurvy was made, and the child was treated with 500 mg oral Vitamin C daily for 1 week and then 100 mg of Vitamin C daily thereafter. Incision and drainage of the hematoma was done. Mother was educated about dietary modifications including Vitamin C.

Tenderness and pain reduced and disappeared with treatment.

**Discussion**

Scurvy is less common in the pediatric population, but case reports still appear.[1-3] A review of the literature by Noble et al. reveals 23 case reports of scurvy in children with behaviorally restricted diets including children with autism, mental retardation, and cerebral palsy.[4] Scurvy is common in children with cerebral palsy as they subsist on predominant milk-based diets (due to pseudobulbar palsy and difficulty swallowing solids), and boiled cow’s milk is a very poor source of Vitamin C. Deficiencies may be noted in preterm babies who are on prolonged total parenteral nutrition therapy, children with malnutrition, and those with acute illnesses.[2,5] Musculoskeletal manifestations such as subperiosteal hemorrhages leading to bone pain and symptoms such as limb pain, swelling over long bones, and progressive leg weakness and fractures are present in 80% of patients with scurvy and are prominent in pediatric population.[6] Dermatological manifestations include petechiae, ecchymoses, hyperkeratosis, and perifollicular hemorrhage.[3,7] Oral symptoms include gingival disease characterized by swelling, bleeding gums, and loosening of teeth.[3,6,8] Systemic symptoms of scurvy in children include lassitude and fatigue, failure to gain weight, loss of appetite, and irritability.[8] In addition to these symptoms, deficiency of ascorbic acid may lead to a hypochromic microcytic
anemia because of decreased absorption of iron, bleeding, and dietary deficiencies.\(^\text{1,6}\) The diagnosis of scurvy is based on history of poor dietary intake of Vitamin C, classic clinical features and radiological findings, and response to treatment with Vitamin C.\(^\text{[3]}\) Weinstein et al.\(^\text{[3]}\) recommend oral doses of 100–300 mg of Vitamin C daily until body stores are replenished per serum levels. Daily fruit and vegetable intakes should include a good source of Vitamin C such as citrus fruits. After Vitamin C supplementation, metaphyseal abnormalities will completely resolve. The large shells of periosteal bone are common radiographic findings particularly during the healing phase of disease.\(^\text{[9]}\) Various factors contribute to nutritional deficiencies in nonambulant children with severe spastic cerebral palsy such as poor intake, oral motor dysfunction, feeding problems, and use of antiepileptic drugs.\(^\text{[10]}\)

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

**References**

1. Larralde M, Santos Muñoz A, Boggio P, Di Gruccio V, Weis I, Schygiel A. Scurvy in a 10-month-old boy. Int J Dermatol 2007;46:194-8.
2. Rosati P, Boldrini R, Devito R, Menditto A, Barbuti D, Nibbi F, et al. A child with painful legs. Lancet 2005;365:1438.
3. Weinstein M, Babyn P, Zlotkin S. An orange a day keeps the doctor away: Scurvy in the year 2000. Pediatrics 2001;108:E55.
4. Noble JM, Mandel A, Patterson MC. Scurvy and rickets masked by chronic neurologic illness: Revisiting “psychologic malnutrition”. Pediatrics 2007;119:e783-90.
5. Rajakumar K. Infantile scurvy: A historical perspective. Pediatrics 2001;108:E76.
6. Popovich D, McAlhany A, Adewumi AO, Barnes MM. Scurvy: Forgotten but definitely not gone. J Pediatr Health Care 2009;23:405-15.
7. Burk CJ, Molodow R. Infantile scurvy: An old diagnosis revisited with a modern dietary twist. Am J Clin Dermatol 2007;8:103-6.
8. Chatproedprai S, Wananukul S. Scurvy: A case report. J Med Assoc Thai 2001;84:S106-10.
9. Resnick D. Hypervitaminosis and hypovitaminosis. Diagnosis of Bone and Joint Disorders. 4th ed. Philadelphia, PA, USA: WB Saunders; 2002.
10. Henderson RC, Lin PP, Greene WB. Bone-mineral density in children and adolescents who have spastic cerebral palsy. J Bone Joint Surg Am 1995;77:1671-81.