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Case Report

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The Guilbaud-Vainsel Syndrome Patient Presenting with Quadriparesis

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ABSTRACT

Guilbaud-Vainsel syndrome is characterized by osteopetrosis, renal tubular acidosis, and intracerebral calcification. Guilbaud syndrome is also called marble brain disease. It can be seen as a result of carbonic anhydrase II deficiency and is inherited autosomal recessively. carbonic anhydrase II is 1 of the 7 soluble isoenzymes synthesized in the kidney, bone, brain, and lungs. It is more common in children, and it is rarely seen in adults. The aim of this article is to discuss, in line with the literature, Guilbaud-Vainsel syndrome in a 28-year-old patient with quadriparesis due to hypokalemia.

Keywords: Hypokalemia, osteopetrosis, renal tubular acidosis

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INTRODUCTION

Carbonic anhydrase II deficiency is a rare disease classically characterized by osteopetrosis, renal tubular acidosis (RTA), and cerebral calcification. Other symptoms include short stature, mental retardation, ovalocytosis anemia, retinal changes, and multiple cranial nerve palsy. Other features of this disorder include craniofacial disproportion, a prominent forehead, small mouth, micrognathia, and thick lower lip. Optical atrophy and retinal atrophy were also found in some patients. Hematological disorders, including anemia, thrombocytopenia, and leukopenia, are typically found in a variety of serious recessive diseases.[1,2] The aim of this article is to discuss Guilbaud-Vainsel syndrome in a 28 year-old patient with quadriparesis due to hypokalemia.

CASE PRESENTATION

A 28-year-old male patient was admitted to the emergency room with weakness in the upper and lower extremities. There were no previous sicknesses in his medical records, and there was no kinship between his parents. In his family history, a 4-month-old baby has died, and an 8-year-old girl has been found to have osteopretrosis. In his child's genetic research, CLCN7 gene exon 17 homozygous deletion was detected. Carbonic anhydrase 2 gene c.428T>C (p.L143p) heterozygous mutation was detected. In addition, IVS7-12T>G (c.714-12T>G) homozygous mutation was detected in TCIRG1 gene. On physical examination, his blood pressure was 120/70 mm Hg, his facial features were rough, he has micrognathia, muscle weakness in the upper extremity was 2/5, and muscle weakness in the lower extremity was 4/5. Laboratory findings are given in Table 1. Hypokalemia was detected in the patient, and quadriparesis was attributed to hypokalemia. Metabolic acidosis with normal anion gap was detected in the patient's blood gas. Urine suggested that proximal RTA was anion gap negative. Renal ultrasound was evaluated as normal. Diffuse osteopetrosis was observed on the head, long bone, and hip radiograph, and computed tomography showed 7-mm diameter densities in the deep white matter in the centrum semioval and symmetrically located calcifications in both basal ganglion anteriors (Figure 1). The patient who was found to have osteopetrosis, intracerebral calcification, and proximal RTA was diagnosed with Guilbaud-Vainsel syndrome. In genetics test, TCIRG1 gene IVS7-12T>G (c.714-12T>G) heterozygous mutation was

Table 1. Laboratory Findings	
Blood glucose	104 mg/dL (70–110)
Blood urea nitrogen	18 mg/dL (7–25)
Serum creatinine	0.75 mg/dL (0.6–1.3)
Serum sodium	141 mmol/L (130–145)
Serum potassium	2.47 mmol/L (3.5–5.5)
Serum chloride	117 mmol/L (98–106)
Serum magnesium	2.4 mg/dL (1.7–2.7)
Serum calcium	8.8 mmol/L (8.6–10)
Serum creatinine phosphokinase	
Hemoglobin	14 2 g/dL (13.5–17.5)
White blood cells	8.3 x 10^9/L (4.5–11)
Platelet count	201 x 10^9/L (150–403)
pH	7.154
pCO_2	34.9 mm Hg
HCO_3	12.3 mmol/L
Anion gap	11. 7 mEq/L (12±2 mEq/L)
Urine pH	6 (5-7)
Urine sodium	153 mEq/L (54-150)
Urine potassium	6.9 mEq/L (20-80)
Urine chloride	164 mEq/L (46-168)
Urine anion gap	−4.1 mEq/L (0/-200)

detected. However, carbonic anhydrase gene mutation could not be performed. In the treatment of the patient, intravenous potassium replacement was carried out for hypokalemia and sodium bicarbonate medication was given a start. On the second day of his follow-up, his biochemical parameters returned to normal, and the patient's complaints faded away. We stopped administering potassium; we continued with the sodium bicarbonate medication. In addition, calcitriol was added to the patient's treatment. The patient is still being followed up in our outpatient clinic.

DISCUSSION

Carbonic anhydrase II deficiency is rarely seen with autosomal recessive transition. Carbonic anhydrase II is 1 of the 7 soluble isoenzymes, synthesized in the kidney (proximal tubule and collecting duct), bone, brain, erythrocytes, and lungs. It has a role in osteoclast function and bone resorption, urinary acidification and bicarbonate resorption. Carbonic anhydrase II is a zinc metalloenzyme that catalyzes the reversible hydration of carbon dioxide to form carbonic acid (H_2CO_3). Carbonic anhydrase II deficiency disrupts H production by osteoclasts, thereby inhibiting bone resorption, leading to the development of osteopetrosis.[3,4]

Most cases of autosomal recessive osteopetrosis are caused by defects in the T cell immune regulator 1 (TCIRG1) or chloride channel-7 (CLCN7) genes. A defect in acidification paired with osteopetrosis due to carbonic anhydrase II deficiency consequents as the common basis of the disease.[5,6]

Osteopetrosis includes a heterogeneous group of diseases characterized by increased cortical and trabecular bone thickness and susceptibility to fractures and high bone density. This may result in a decreased number of differentiated osteoclasts or decreased bone resorption due to a defect in osteoclast function. The clinical severity of these features varies, and forms of osteopetrosis have traditionally been supplemented by other related clinical features such as age of onset, affected bones, RTA, neurological disorder, retinal atrophy, or immune defects.[7]

RTA may be of mixed proximal and distal type, but distal or proximal RTA may be dominant. It has also been documented that different allelic variants can cause autosomal dominant (and recessive) forms of osteopetrosis. In other families with autosomal-dominant osteopetrosis, mutations at low-density lipoprotein receptor 5 (LRP5) have been detected. Carbonic anhydrase II deficiency is mostly recorded in the Arabian Gulf region, Japan; in addition, American and Belgian mutations have been identified.[4]

It is more common in children, but can also be observed in adults. RTA and osteopetrosis and intracerebral calcification were detected in a 26-year-old male patient with developmental retardation, multiple fractures, and quadriparesis. In another case, a case of RTA, intracerebral calcification, and osteopetrosis was found present in a 27-year-old male patient with complaints of muscle pain, contraction, and fever.[4,8]

Osteopetrosis is a clinical syndrome that leads to osteoclasts not being able to absorb bone and to disrupt remodeling. These conditions can be inherited as autosomal recessive, dominant, or X-linked features. Due to carbonic anhydrase isoenzyme II deficiency, a prominent form of autosomal recessive osteopetrosis (known as marble brain disease) occurs in relation to RTA and cerebral calcification. Although severe cases can benefit from hematopoietic stem cell transplantation, treatment can be supported with electrolyte replacement and calcitriol.[8]

MAIN POINTS

- Guilbaud-vainsel syndrome is rarely seen in adults.
- Guilbaud vainsel syndrome develops as a result of carbonic anhydrase isoenzyme-II (CAII) deficiency.
- It is characterized by renal tubular acidosis, osteopetrosis and intracerebral calcification.
- Guilbaud-vainsel syndrome was diagnosed in a 28-year-old man who presented with hypokalemia-induced quadriparesis.

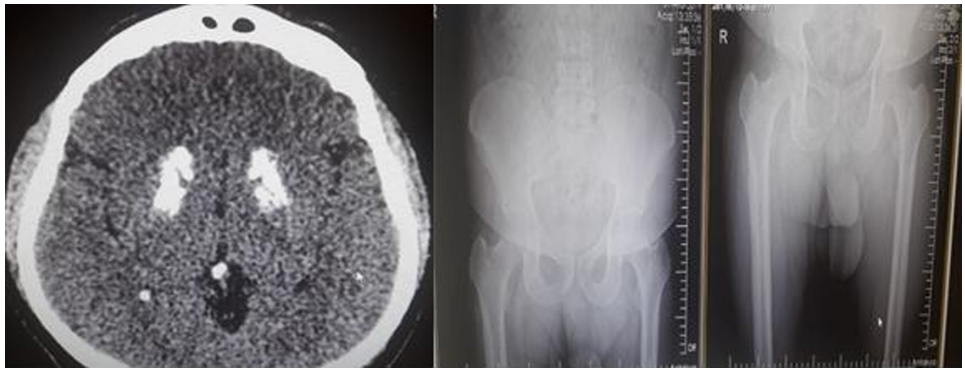

Figure 1. Intracerebral calcifications on computed tomography and diffuse osteosclerosis on long bone radiographs.

As a result, Guilbaud-Vainsel syndrome is rare in adults. Family screening is important for early diagnosis in rare diseases. Our case was screened for osteopetrosis. Carbonic anhydrase enzyme II mutation was detected in a child, but it was not performed in our patient. Alkali treatment and calcitriol are recommended for treatment.

Informed Consent: Verbal consent was obtained from the patient.

Peer Review: Externally peer-reviewed.

Conflict of Interest: The author has no conflict of interest to declare.

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