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A Rare Side Effect of a Frequent Medicine in Children: Quartz Stone

Emre Leventoğlu[1*], Selin Kuzucu[2], Kibriya Fidan[1] and Oğuz Söylemezoğlu[1]

[1]Department of Pediatric Nephrology, Gazi University, Ankara, Turkey
[2]Department of Pediatric, Gazi University, Ankara, Turkey

[*]**Corresponding author:** Leventoğlu E, Faculty of Medicine, Department of Pediatric Nephrology, Gazi University, Ankara, Turkey, Tel: +90 312 202 60 00; E-mail: dremrelevent@gmail.com

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Abstract

Kidney silicate stone is rare, with an incidence of 0.2% of all urinary stones. Here, a 7-year-old female patient who was admitted with urinary stones is presented. In stone analysis, quartz mineral was observed. It was seen that a drug used by the patient regularly included silicon dioxide that is most often recognized in the form of quartz, which is used in the pharmaceutical industry to form a tablet, as an excipient. The fact that the disease is very rare causes curiosity on this subject. When prescribing drugs to the patient, possible side effects of the excipients should be evaluated.

Keywords: ***Children; Nephrolithiasis; Ursodeoxycolic acid; Quartz stone***

1. Introduction

Urolithiasis is a non-malignant condition that can affect any part of the urinary tract. Kidney stone formation is affected by factors such as climate, dietary habits, drugs, occupation, fluid intake, genetic predisposition, urinary tract infections and malformations in the urinary tract [1].

With this case report, the surprising reason for the formation of silicate stone, which is extremely rare, was explained.

2. Case

A 7-year-old female patient who had a bone marrow transplant due to aplastic anemia two years ago was admitted to our out-patient clinic with the complaint of stone in the urine. Approximately 1 month ago, the patient with left flank pain noticed a 0.4x0.5mm gray-beige stone in her urine. The complaint could not be repeated afterwards. In the family history only, the grandmother had a history of nephrolithiasis in old age.

Upon presentation, her physical examination was notable for body weight of 25 kg (50-75 p), height 115 cm (10-25 p). Her temperature was 36.6°C, heart rate 92 /min and blood pressure 100/60 mmHg (50-90 p). Laboratory examination revealed blood urea nitrogen 10 mg/dL, serum creatinine 0.39 mg/dL, uric acid 5.1 mg/dL, sodium 141 mmol/L, potassium 4.2 mmol/L, chloride 105 mmol/L, calcium 10.5 mg/dL, phosphorus 4.6 mg/dL, blood pH 7.36 and 24.9 HCO3 mmol/L. On urine; protein 4 mg/dL, creatinine 46 mg/dL, sodium 48 mmol/L, calcium 0.7 mg/dL, phosphorus 22.4 mg/dL, oxalate 0.7 mg/dL, citrate 16.2 mg/dL. Tubular phosphate reabsorption was 95.8%, fractional excretion of sodium was 0.2%. Urine protein/creatinine was 0.08 mg/mg calcium/creatinine was 0.01 mg/mg, oxalate/creatinin 0.01 mg/mg, citrate/creatinine 0.35 mg/mg (TABLE 1). Urine density was measured as 1007, and urine pH was measured in fresh urine by dipstick as 6. The urine output was 3.6 ml/kg/hour. Abdominal ultrasonography was normal. She was using only ursodeoxycholic acid as a drug for 18 months because of post-transplant hyperbilirubinemia.

TABLE 1. **Plasma and Urine Laboratory Evaluation.**

	Patient	**Reference value**
Blood		
BUN (mg/dl)		5-18
Creatinine (mg/dl)	0.39	0.16-0.39
Calcium (mg/dl)	10.5	9-11
Phosphorus(mg/dl)	4.6	4-7
Sodium (mmol/L)	141	136-146
Chloride (mmol/L)	105	101-109
Potassium (mmol/L)	4.2	3.5-5.1
pH	7.36	7.35-7.45
HCO3 (mmol/L)	24.9	22-26
Urine		
Creatinine (mg/dl)	46	16-327
Calcium (mg/dl)	0.7	
Calcium/creatinine (mg/mg)	0.01	<0.8
Phosphorus(mg/dl)	22.4	
Sodium (mmol/L)	48	
pH	6	5-7.5
TRP (%)	95.8	82-98
FeNa (%)	0.2	<2

In the stone analysis performed by X-ray diffraction method, dolomite ($CaMg(CO_3)_2$) mineral accompanied by calcium was observed in addition to the quartz mineral (SiO_2).

3. Discussion

Urolithiasis is a is a frequently disease which incidence has increased to 3.3% in the pediatrics [1]. Kidney silicate (quartz) stone is very rare, with an incidence of 0.2% of all urinary stones in humans. Silica is an important component of sand. Silica is found in urinary stone in two forms, opaline and quartz. The quartz is more prevalent than opaline. The high concentration of silicate in the urine is thought to cause silicate to precipitate, and urine alkalinization; and the deposition of calcium salt around silicate aggregates is thought to trigger stone formation [2]. Urinary silica concentration was dependent on the intake of foods or drugs containing silica. Reported cases of silicate stones have been documented mostly in adults and are often associated with excessive intake of magnesium trisilicate in food or medications [3].

Paters et al reported that urinary silica concentration was dependent on the intake of foods containing silica such as green bean, banana, leafy greens, creals, oat bran, and lentils [4]. A silicate stone has been reported in a 10-month-old boy in Japan. When the etiology was investigated in the present patient, it was found that the baby was fed with a formula dissolved in mineral water rich in silicate for 8 months [2]. In our patient, a history of nutrition with products containing high doses of silicate could not be demonstrated.

It has been reported as a case of deliberate sending of fake stones by patients with psychological disorders such as Munchausen syndrome. However, in stone analysis, it has been shown that the content of the stone consists of inorganic elements such as aluminum and other metals [5]. In our patient's stone analysis, although rare, dolomite and quartz minerals have been observed that may be organic. And no clue suggesting Munchausen syndrome was noticed in the patient or her family during the follow-up.

It is also known that silicate urinary stones occur in patients who take antacids containing high amounts of silicate [6]. In our patient, there has been no history of antacid use. When the history of drug use of our patient was examined, it was learned that she had been using ursodeoxycholic acid for 18 months. It was seen that the drug used by the patient regularly included silicon dioxide that is most often recognized in the form of quartz, which is used in the pharmaceutical industry to form a tablet, as an excipient.

In our case, the ursodeoxycholic acid tablet form that the patient was using was changed to the syrup form which is silicon dioxide free. Also, hydration and a salt-restricted diet are recommended in the treatment and no new stone formation was observed in the follow-up.

The fact that the disease is very rare causes curiosity on this subject. The importance of performing stone analysis as short as possible becomes clear once again. When prescribing drugs to the patient, not only the side effects of the active substance should be taken into consideration, but also the possible side effects of the excipients in the drug content should be evaluated.

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